04/28/94

#8

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. 0290112

Art Unit: 1109
Examiner: H. Myers

In re application
PETER J. JESSUP ET AL.

Serial No. 08/077,243
Filed: June 14, 1993

GASOLINE FUEL

The Honorable Commissioner
of Patents and Trademarks
Washington, D. C. 20231

Sir:

AFFIDAVIT OF DR. ROBERT L RUSSELL

I, Dr. Robert L. Russell, being duly sworn, do hereby depose and say:

I earned a Bachelor of Science degree in 1964 in Chemistry from the University of New Hampshire and a PhD degree in 1971 from the University of California, Irvine (UCI). From 1971 to 1974, I did postdoctoral work in chemistry at UCI, Brookhaven National laborary, Upton, Long Island, and UCI.

I commenced work for Union Oil Company of California, dba Unocal, in 1974 as a professional scientist in the fuels research group. My entire career since commencing my employment has been related to fuels, particularly gasolines. My present title is Senior Research Associate. From 1974 to 1986 my work was primarily directed to solving environmental pollution problems associated with evaporative emissions of gasoline from storage tanks and automotive vehicle gasoline tanks and with gasoline volatility effects, as measured by Reid Vapor Pressure,

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Research Laboratory Record

Union Oil Company of California

UNION 76 2ND QUARTER Page AK 8796

Attachment A

QUARTERLY SURVEY

Date	Project No.
6-2-86	720 - 10181 73130

UNOCAL 76 UNLEADED REGULAR GASOLINES

AREA	ANCHORAGE	BAKERSFIELD	HONOLULU	PHOENIX	PORTLAND
GRADE	REG.	REG.	REG.	REG.	REG.
SAMPLE I.D.	7.	8.	9.	10.	11.
API GRAV. @ 60°F	60.1	57.2	56.3	56.5	60.4
D86 DIST (% EVAP) IBP	88	93	87	94	88
5%	90	109	100	109	94
10%	101	124	111	125	105
20%	120	144	126	141	117
30%	139	165	141	165	130
50%	180	221	194	212	172
70%	223	226	238	254	231
90%	276	327	274	342	283
95%	296	371	291	378	312
EP	345	415	323	430	362
% REC / BOTTS	95.0/1.0	97.0/2.0	97.5/1.5	97.0/1.0	96.5/1.0
W.U.N.	322	391	340	388	318
FIA % A	37.0	46.5	41.0	33.0	32.5
% O	∅	∅	0.5	6.0	4.0
% S	63.0	53.5	58.5	61.0	63.5
RVP (PSI)	12.95	8.40	6.70	8.45	11.30
LEAD (gm/gal)	<0.001	<0.001	<0.001	0.003	<0.001
S (ppm)	12	104	<5	138	32
TV/LR @ 20:1	116.0	144.5	126.2	141.5	121.6
RON	90.8	92.8 * 93.4	93.4	91.0	91.7
MON	83.6	83.8 * 84.0	85.2	82.5	84.2
(R+M)/2	87.2	88.3 88.7	89.3	86.8	88.0
OLEYLAMINE (#MB)	11.1	∅	17.4	15.5	14.8
BENZENE (wt %)	5.03	4.41	6.72	2.07	4.53
PRICE	0.89 9		1.12 9	0.97 9	1.03 9
LEASE #	5580	5488	4573	4809	5953
DATE RECEIVED					
DATE SAMPLED	6/3	6/5	5/23	5/28	6/2

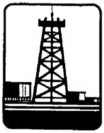
Signatures Mark [signature]

* = RERUN

Attachment A

Attachment B

1993



ANNUAL BOOK OF ASTM STANDARDS

SECTION
5

Petroleum Products, Lubricants, and Fossil Fuels

ASTM

VOLUME
05.03

Petroleum Products and Lubricants (III): D 4636 - latest; Catalysts

Revision issued annually

Attachment B

to cause vapor lock, as evidenced by loss of power during full-throttle accelerations, is indicated by the gasoline temperature at a V/L of approximately 20. A similar relationship for gasoline-oxygenate blends has also been determined. The temperature at which the maximum V/L is specified for each gasoline volatility class is based on the ambient temperatures and the altitude associated with the use of the class.

X1.11 Vapor-Liquid Ratio (Estimated)

X1.11.1 Three techniques for estimating temperature-V/L values using vapor pressure (Test Methods D 4953, D 5190, or D 5191) and distillation (Test Method D 86) results are given in Appendix X2; they apply to gasoline only.

X1.12 Distillation

X1.12.1 Test Method D 86 for distillation provides another measure of the volatility of fuels. Table 1 designates the limits for end-point temperature and the temperatures at which 10 %, 50 %, and 90 % by volume of the fuel is evaporated. These distillation characteristics, along with vapor pressure and V/L characteristics, affect the following vehicle performance characteristics: starting, driveability, vapor lock, dilution of the engine oil, fuel economy, and carburetor icing.

X1.12.2 The 10 % evaporated temperature of fuel should be low enough to ensure starting under normal temperatures.

X1.12.3 Fuels having the same 10 % and 90 % evaporated temperatures can vary considerably in driveability performance because of differences in the boiling temperatures of the intermediate components, or fractions. Driveability and idling quality are affected by the 50 % evaporated temperature. The 90 % evaporated and end-point temperatures should be low enough to minimize dilution of the engine oil.

X1.13 Corrosion

X1.13.1 Fuels must pass the copper strip corrosion test to minimize corrosion in fuel systems due to sulfur compounds in the fuel. Some fuels corrode fuel system metals other than copper, but there are no ASTM test methods to evaluate corrosion of these metals. Depending on the type and concentration of oxygenate, gasoline-oxygenate blends can corrode metals such as zinc, magnesium, aluminum, steel, and terne. However, at this time there is no test method with a known correlation to field performance. Consequently, additional corrosion tests are needed.

X1.14 Existent Gum

X1.14.1 The test for existent gum measures the amount of residue after evaporation of the fuel and after a heptane wash. The heptane wash removes the heptane-soluble material such as additives and nonvolatile oils, which can have been added to the fuel. Excess existent gum can cause harmful carburetor, engine intake manifold and intake valve deposits.

X1.15 Sulfur

X1.15.1 The limit on sulfur content is included to protect against engine wear, deterioration of engine oil, and corrosion of exhaust system parts.

X1.16 Oxidation Stability

X1.16.1 The induction period as measured in the oxidation stability test is used as an indication of the resistance of fuel to gum formation in storage. Experience indicates that fuels with an induction period equal to or greater than that in Table 1 generally have acceptable short-term storage stability. However, correlation of the induction period with the formation of gum in storage can vary markedly under different storage conditions and with different fuels.

X2. ESTIMATING TEMPERATURE-V/L VALUES FOR GASOLINE

X2.1 Scope

X2.1.1 Three techniques are presented here for estimating temperature-V/L data from vapor pressure and distillation test results[13] on gasolines only. They are provided for use as a guideline when V/L data measured by Test Method D 2533 are not available. One method is designed for computer processing, one is a simpler linear technique, while the other is a nomogram form of this linear equation.

X2.1.2 These techniques are not optional procedures for measuring V/L. They are supplementary tools for estimating temperature-V/L relationships with reasonable accuracy when used with due regard for their limitations.

X2.1.3 Test Method D 2533 is the referee V/L procedure and shall be used when calculated values are questionable.

X2.1.4 These techniques are not intended for, nor are they necessarily applicable to, fuels of extreme distillation or chemical characteristics such as would be outside the range of normal commercial motor gasolines. Thus, they are not applicable in all instances to gasoline blending stocks or specially blended fuels.

X2.2 Computer Method

X2.2.1 *Summary*—The values of four intermediate functions, A, B, C, and D, are derived from the gasoline vapor pressure and distillation temperatures at 10, 20, and 50 % evaporated. Values for A, B, C, and D can be obtained either from equations or from a set of charts. Sections X2.2.2.1 through X2.2.2.3 provide A, B, C, and D values using SI units; X2.2.2.6 through X2.2.2.8 provide A, B, C, and D values using inch-pound units. Estimated temperatures at a V/L of 4, 10, 20, 30, and 45 are then calculated from A, B, C, and D. Estimated temperatures at an intermediate V/L can be obtained by interpolation.

X2.2.2 *Procedure:*

X2.2.2.1 Establish input data from vapor pressure (Test

[13] A correlation of temperature-V/L ratio data with vapor pressure and distillation data was developed in 1943 and restudied in 1963 by panels of the Coordinating Research Council, Inc. See "Correlation of Gasoline Vapor Forming Characteristics with Inspection Test Data," *CRC Report No. 159*, Jan. 28, 1943 (or SAE Transaction, Vol 52, August 1944, pp. 364–367) and "Study of CRC Calculated Temperature-V/L Technique," *CRC Report No. 370*, February 1963. The CRC correlation was modified by a task group of Subcommittee A of Committee D-2 to adapt it for computer processing, as well as the linear equation and the nomogram.

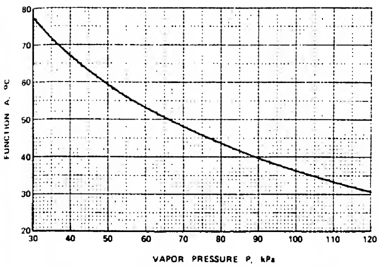


FIG. X2.1 Function *A* versus Vapor Pressure *P*

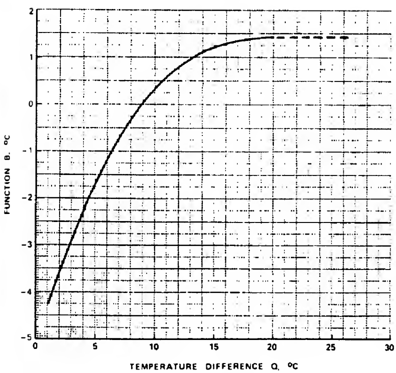


FIG. X2.2 Function *B* versus Distillation Temperature Difference *Q*

Methods D 4953, D 5190, or D5191) and distillation (Test Method D 86) test results as follows:

E = distillation temperature, °C at 10 % evaporated,
F = distillation temperature, °C at 20 % evaporated,
G = distillation temperature, °C at 50 % evaporated,
$H = G - E$, °C, (X2.1)
P = vapor pressure, kPa,
$Q = F - E$, °C, and (X2.2)
$R = H/Q$, except that if H/Q is greater than 6.7, make $R = 6.7$. (X2.3)

X2.2.2.2 If A, B, C, and D, are to be calculated use the following equations:

$$A = 102.859 - 1.36599P + 0.009617\,P^2 - 0.000028281P^3 + 207.0097/P \quad (X2.4)$$

$$B = -5.36868 + 0.910540Q - 0.040187\,Q^2 + 0.00057774Q^3 + 0.254183/Q \quad (X2.5)$$

$$S = -0.00525449 - 0.3671362/(P - 9.65) - 0.812419/(P - 9.65)^2 + 0.0009677R - 0.0000195828R^2 - + 3.3502318R/P^2 + 1241.1531R/P^4 - 0.06630129R^2/P + 0.00627839R^3/P + 0.0969193R^2/P^2 \quad (X2.6)$$

$$C = 0.34205P + 0.55556/S \quad (X2.7)$$

$$D = 0.62478 - 0.68964R + 0.132708R^2 + - 0.0070417R^3 + 5.8485/R \quad (X2.8)$$

X2.2.2.3 If A, B, C, and D, are to be obtained from charts, read them from Figs. X2.1, X2.2, X2.3, and X2.4, respectively.

X2.2.2.4 Calculate the estimated temperature (°C or °F) at V/L ratios 4, 10, 20, 30, and 45 from the following equations:

$$T4 = A + B \quad (X2.9)$$

$$T45 = F + 0.125H + C \quad (X2.10)$$

$$T10 = T4 + 0.146341\,(T45 - T4) + D \quad (X2.11)$$

$$T20 = T4 + 0.390244\,(T45 - T4) + 1.46519D \quad (X2.12)$$

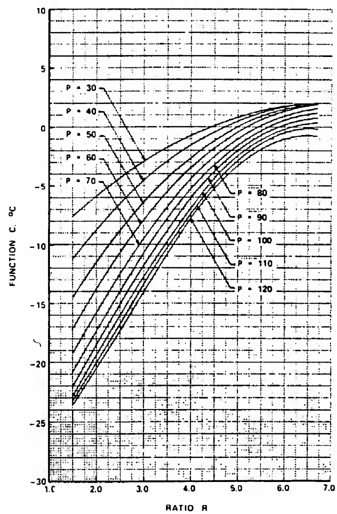


FIG. X2.3 Function C versus Ratio *R* and Vapor Pressure *P*

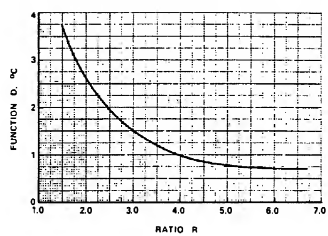


FIG. X2.4 Function *D* versus Ratio *R*

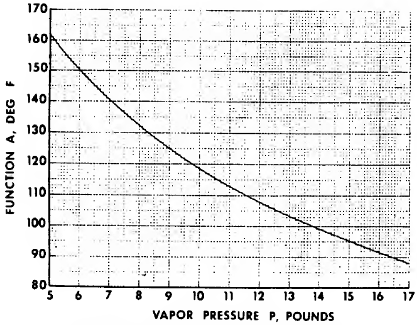


FIG. X2.5 Function *A* versus Vapor Pressure *P*

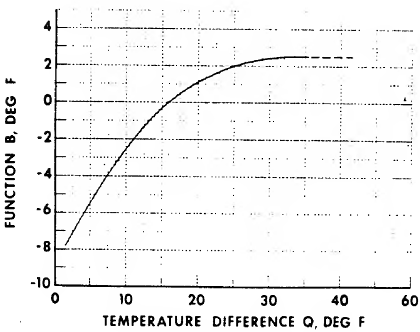


FIG. X2.6 Function *B* versus Distillation Temperature Difference *Q*

$$T30 = T4 + 0.634146\,(T45 - T4) + D \qquad \text{(X2.13)}$$

where:

$T4$, $T10$, $T20$, $T30$, and $T45$ are estimated temperatures at V/L ratios, 4, 10, 20, 30, and 45.

X2.2.2.5 If the temperature at an intermediate V/L ratio is to be estimated, either plot the values calculated in X2.2.2.4 and read the desired value from a smooth curve through the points, or use the Lagrange interpolation formula as follows:

$$\begin{aligned} TX = {} & T4\left(\frac{X-10}{4-10} \times \frac{X-30}{4-30} \times \frac{X-45}{4-45}\right) \\ & + T10\left(\frac{X-4}{10-4} \times \frac{X-30}{10-30} \times \frac{X-45}{10-45}\right) \\ & + T30\left(\frac{X-4}{30-4} \times \frac{X-10}{30-10} \times \frac{X-45}{30-45}\right) \\ & + T45\left(\frac{X-4}{45-4} \times \frac{X-10}{45-10} \times \frac{X-30}{45-30}\right) \end{aligned} \qquad \text{(X2.14)}$$

where:

X = the desired V/L ratio between 4 and 45, and

TX = the estimated temperature at V/L ratio X.

X2.2.2.6 If inch-pound units are used, establish input data from vapor pressure (Test Methods D 4953, D 5190, or D 5191) and distillation (Test Method D 86) test results as follows:

E = distillation temperature, °F, at 10 % evaporated,

F = distillation temperature, °F, at 20 % evaporated,

G = distillation temperature, °F, at 50 % evaporated,

$H = G - E$, °F (X2.15)

P = vapor pressure, psi,

$Q = F - E$, °F, and (X2.16)

$R = H/Q$, except that if H/Q is greater than 6.7, make $R = 6.7$. (X2.17)

X2.2.2.7 If A, B, C, and D are to be calculated in inch-pound units, use the following equations:

$$A = 217.147 - 16.9527P + 0.822909P^2 - 0.0166849P^3 + 54.0436/P \qquad \text{(X2.18)}$$

$$B = -9.66363 + 0.910540Q - 0.0223260Q^2 \qquad \text{(X2.19)}$$

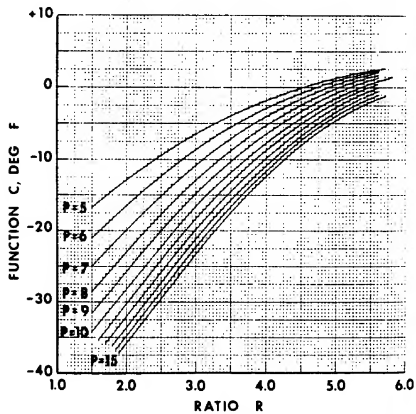


FIG. X2.7 Function *C* versus Ratio *R* and Vapor Pressure *P*

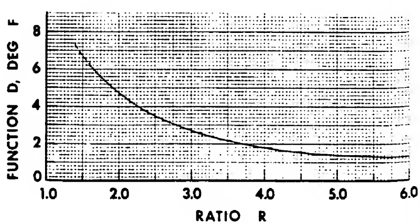
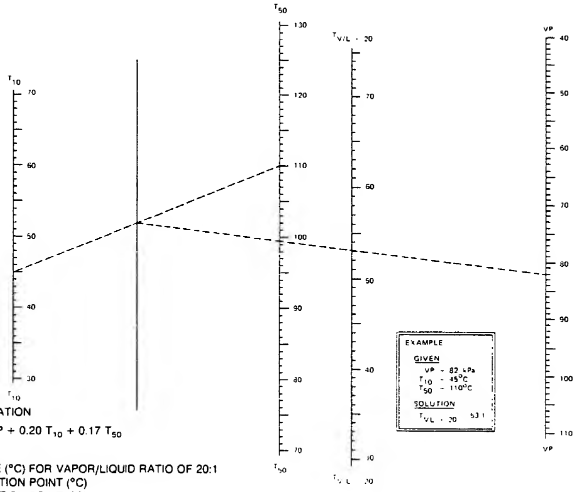


FIG. X2.8 Function *D* versus Ratio *R*



NOMOGRAM SOLVES EQUATION

$T_{V/L=20}$ = 52.47 − 0.33 VP + 0.20 T_{10} + 0.17 T_{50}

where:

$T_{V/L=20}$ = TEMPERATURE (°C) FOR VAPOR/LIQUID RATIO OF 20:1
T_{10} = 10 % EVAPORATION POINT (°C)
T_{50} = 50 % EVAPORATION POINT (°C)
VP = VAPOR PRESSURE (kPa)

FIG. X2.9 Relationship Between Gasoline Volatility and Temperature for *V/L* Ratio at Sea Level—SI Units

$$+ 0.000178314Q^3 + 0.823553/Q$$

$$S = -0.00525449 - 0.0532486/(P - 1.4) - 0.0170900/(P - 1.4)^2 + 0.0009677R - 0.0000195828R^2 - 0.0704753R/P^2 + 0.549224R/P^4 - 0.00961619R^2/P + 0.000910603R^3/P + 0.00203879R^2/P^2 \quad (X2.20)$$

$$C = 4.245P + 1.0/S \quad (X2.21)$$

$$D = 1.12460 - 1.24135R + 0.238875R^2 - 0.0126750R^3 + 10.5273/R \quad (X2.22)$$

X2.2.2.8 If *A*, *B*, *C*, and *D* are to be obtained from charts in inch-pound units, read them from Figs. X2.5, X2.6, X2.7, and X2.8 respectively.

X2.2.2.9 Calculate the estimated temperatures, °F, at *V/L* ratios 4, 10, 20, 30, and 45 using the equations in X2.2.2.4 and X2.2.2.5.

X2.3 Linear Equation Method

X2.3.1 *Summary*—As given, these two equations provide only the temperatures (°C or °F) at which a *V/L* value of 20 exists. They make use of two points from the distillation curve, T_{10} and T_{50} (°C or °F), and the vapor pressure (kPa or psi) of the gasoline with constant weighting factors being applied to each. Experience has shown that data obtained with these simple linear equations generally are in close agreement with those obtained by the computerized version given above. The limitations pointed out in X2.1.1 through X2.1.4 must be kept in mind when use is made of this procedure.

X2.3.2 *Procedure*—Obtain 10 % evaporated and 50 % evaporated points from the distillation curve (Test Method D 86) along with the vapor pressure value (Test Methods D 4953, D 5190, or D 5191); apply these directly in the equation.

$$T_{V/L=20} = 52.47 - 0.33\,(VP) + 0.20\,T_{10} + 0.17\,T_{50} \quad (X2.23)$$

where:

$T_{V/L=20}$ = temperature, °C, at *V/L* of 20:1,
VP = vapor pressure, kPa,
T_{10} = distillation temperature, °C, at 10 % evaporated, and
T_{50} = distillation temperature, °C, at 50 % evaporated.

or in the inch-pound customary unit equation:

$$T_{V/L=20} = 114.6 - 4.1\,(VP) + 0.20\,T_{10} + 0.17\,T_{50} \quad (X2.24)$$

where:

$T_{V/L=20}$ = temperature, °F, at *V/L* of 20:1,
VP = vapor pressure, psi,
T_{10} = distillation temperature, °F, at 10 % evaporated, and
T_{50} = distillation temperature, °F, at 50 % evaporated.

X2.4 Nomogram Method

X2.4.1 *Summary*—Two nomograms have been developed and are included herein (Figs. X2.9 and X2.10) to provide the same function as the linear equations procedure outlined above. Figure X2.9 is in SI units and Fig. X2.10 is in inch-pound units. The nomograms are based on the two equations and the same limitations apply to their use in estimating *V/L* (20) temperatures.

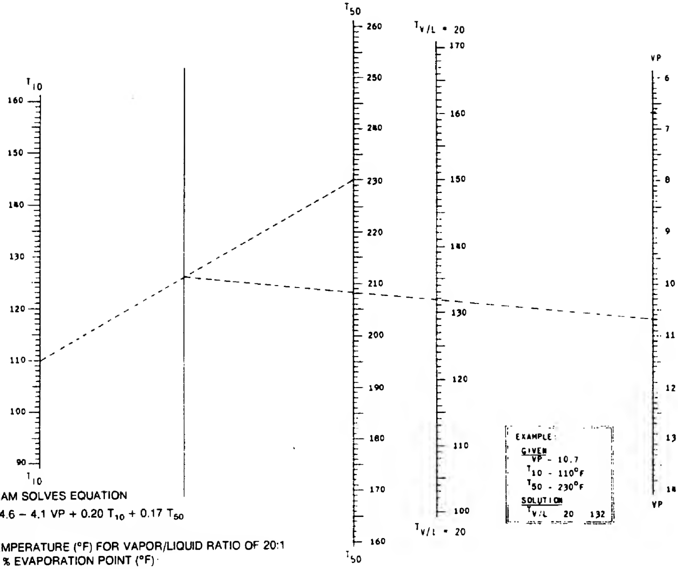


FIG. X2.10 Relationship Between Gasoline Volatility and Temperature for *V/L* Ratio of 20 at Sea Level—Inch-Pound Units

X2.4.2 *Procedure*—Obtain 10 % evaporated and 50 % evaporated points from the distillation curve (Test Method D 86) along with the vapor pressure value (Test Methods D 4953, D 5190, or D 5191). Select the SI unit (Fig. X2.9) or inch-pound unit (Fig. X2.10) nomogram based on the units of T_{10}, T_{50}, and VP. Using a straightedge, locate the intercept on the line between the "T_{10} and T_{50}" scales after selecting the applicable T_{10} and T_{50} values. From this intercept and the proper point on the "VP" scale, a second intercept can be obtained on the "$T_{V/L=20}$" scale to provide the desired value directly.

X2.5 Precision

X2.5.1 The precision of agreement between temperature-V/L data estimated by any one of these three techniques and data obtained by Test Method D 2533 has not been established.

X3. SUMMARY OF EPA REGULATIONS APPLICABLE TO SPARK-IGNITION ENGINE FUEL

X3.1 EPA Applicable Vapor Pressure Standards

X3.1.1 Under authority of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) issued, effective May 1992, vapor pressure control standards for leaded and unleaded gasoline and leaded and unleaded gasoline-oxygenate blends. Some states, notably California, have more restrictive vapor pressure limits.

X3.1.2 Details of the EPA regulations and test methods are available in Part 80 of Title 40 of the Code of Federal Regulations (40 CFR Part 80). For specific state vapor pressure regulations, the state of interest should be contacted.

X3.1.3 The EPA maximum vapor pressure limits of 7.8 psi and 9.0 psi are shown in Table 1 as Classes AA and A, respectively. The EPA requirements for each distribution area are shown in Table 4 for the period May 1 through September 15. For the month of May, the EPA limits only apply to finished gasoline and gasoline-oxygenate blend tankage at refineries, importers, pipelines, and terminals. For the period June 1 through September 15, the EPA limits apply to all locations of the distribution system. Footnotes D through F of Table 4 indicate the ozone nonattainment areas which are limited to 7.8 psi maximum and the appropriate vapor lock protection class. California has controls that vary for the different air basins from as early as March 1 at refineries through as late as October 31. There are no EPA

vapor pressure limits for the states of Alaska or Hawaii.

X3.1.4 EPA regulations allow 1.0 psi higher values for gasoline-ethanol blends than the EPA limits shown in Tables 1 and 4 for the period May 1 through September 15. To qualify, the gasoline-ethanol blends must contain 9 to 10 volume % ethanol. Higher vapor pressure limits for gasoline-ethanol blends under state regulations vary for other time periods, and specific states of interest should be contacted to determine if higher limits apply.

X3.2 EPA Lead and Phosphorus Regulations

X3.2.1 *Unleaded Fuel*—The intentional addition of lead or phosphorus compounds to unleaded fuel is not permitted by EPA. EPA regulations limit their maximum concentrations to 0.05 g lead per U.S. gallon (0.013 g/L) and 0.005 g of phosphorus per U.S. gallon (0.0013 g/L) (see Test Method D 3231), respectively.

X3.2.2 *Leaded Fuel*—EPA regulations limit the lead concentration in leaded fuel to no more than 0.10 g per U.S. gallon (0.026 g/L) averaged per calendar quarter for each refinery. There is no EPA lead limit for any individual gallon of leaded fuel.

X3.3 EPA Oxygenate Regulations Applicable to Unleaded Gasoline-Oxygenate Blends

X3.3.1 *Substantially Similar Rule:*

X3.3.1.1 Section 211(f) (1) of the Clean Air Act prohibits introducing into commerce or increasing the concentration in use of, any fuel or fuel additive, which is not substantially similar to any fuel or fuel additive utilized for emissions certification of any model year 1975, or subsequent model year vehicle or engine, unless a waiver is obtained from the EPA.

X3.3.1.2 Gasoline-oxygenate blends are considered "substantially similar" if the following criteria are met.

(1) The fuel must contain carbon, hydrogen, and oxygen, nitrogen, or sulfur, or combination thereof, exclusively, in the form of some combination of the following:

(*a*) Hydrocarbons;
(*b*) Aliphatic ethers;
(*c*) Aliphatic alcohols other than methanol;
(*d*) (i) Up to 0.3 volume % methanol;
(ii) Up to 2.75 volume % methanol with an equal volume of butanol, or higher molecular weight alcohol;

(2) The fuel must contain no more than 2.0 mass % oxygen except fuels containing aliphatic ethers and/or alcohols (excluding methanol) must contain no more than 2.7 mass % oxygen.

(3) The fuel must possess, at the time of manufacture, all of the physical and chemical characteristics of an unleaded gasoline as specified by Specification D 4814 – 88 for at least one of the Seasonal and Geographical Volatility Classes specified in the standard.

NOTE X3.1—Opinion varies as to whether the EPA "substantially similar" rule requires unleaded gasolines that do not contain oxygenates to meet ASTM specifications.

X3.3.2 *Waivers:*

X3.3.2.1 EPA has issued waivers for blends of gasoline and ethanol (gasohol), gasoline and ethanol with cosolvents, and gasoline and methanol with cosolvents that are less limiting than the "substantially similar" rule. For the latest listing of waviers, EPA should be contacted.

X3.3.2.2 Gasoline-ethanol blends are not required by EPA to meet Specification D 4814 volatility limits (see X3.1.4 for vapor pressure limits). EPA has specified in all other waivers that the volatility of the finished gasoline-oxygenate blend must comply with Specification D 439 or D 4814 climatic and geographical limits.

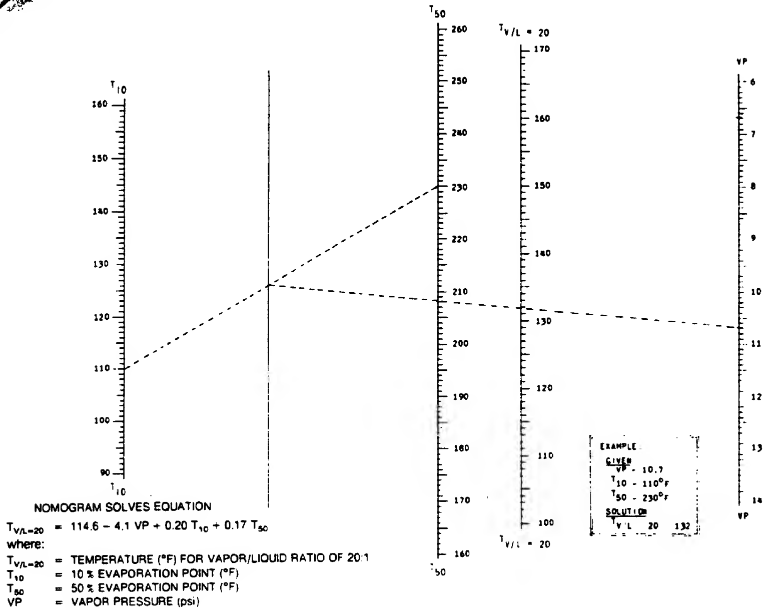


FIG. X2.10 Relationship Between Gasoline Volatility and Temperature for V/L Ratio of 20 at Sea Level—Inch-Pound Units

X2.4.2 *Procedure*—Obtain 10 % evaporated and 50 % evaporated points from the distillation curve (Test Method D 86) along with the vapor pressure value (Test Methods D 4953, D 5190, or D 5191). Select the SI unit (Fig. X2.9) or inch-pound unit (Fig. X2.10) nomogram based on the units of T_{10}, T_{50}, and VP. Using a straightedge, locate the intercept on the line between the "T_{10} and T_{50}" scales after selecting the applicable T_{10} and T_{50} values. From this intercept and the proper point on the "VP" scale, a second intercept can be obtained on the "$T_{V/L=20}$" scale to provide the desired value directly.

X2.5 Precision

X2.5.1 The precision of agreement between temperature-V/L data estimated by any one of these three techniques and data obtained by Test Method D 2533 has not been established.

X3. SUMMARY OF EPA REGULATIONS APPLICABLE TO SPARK-IGNITION ENGINE FUEL

X3.1 EPA Applicable Vapor Pressure Standards

X3.1.1 Under authority of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) issued, effective May 1992, vapor pressure control standards for leaded and unleaded gasoline and leaded and unleaded gasoline-oxygenate blends. Some states, notably California, have more restrictive vapor pressure limits.

X3.1.2 Details of the EPA regulations and test methods are available in Part 80 of Title 40 of the Code of Federal Regulations (40 CFR Part 80). For specific state vapor pressure regulations, the state of interest should be contacted.

X3.1.3 The EPA maximum vapor pressure limits of 7.8 psi and 9.0 psi are shown in Table 1 as Classes AA and A, respectively. The EPA requirements for each distribution area are shown in Table 4 for the period May 1 through September 15. For the month of May, the EPA limits only apply to finished gasoline and gasoline-oxygenate blend tankage at refineries, importers, pipelines, and terminals. For the period June 1 through September 15, the EPA limits apply to all locations of the distribution system. Footnotes D through F of Table 4 indicate the ozone nonattainment areas which are limited to 7.8 psi maximum and the appropriate vapor lock protection class. California has controls that vary for the different air basins from as early as March 1 at refineries through as late as October 31. There are no EPA

ATTACHMENT C

Niper Gasoline Survey Summer 1976 - 1990 13:30 Wednesday, April 6, 1994
except 1987
RVP <= 7 and T50 <= 215F
Total Data Points in Gasoline Survey is 25,898

OBS	rvp (psi)	T50 (F)	T90 (F)	TEL (g/gal)	GRADE	R+M/2	DATE	IBP (F)	T5 (F)	T10 (F)	T20 (F)	T30 (F)	T70 (F)	T95 (F)	EP (F)	CITY	EtOH (%)
1	0.0	.	.	0.26	R	89.20	7/86	.	.	.	.	.	.	.	.	M1	.
2	4.0	210	334	.	R	88.60	6/77	98	105	124	145	165	264	369	424	T4	.
3	4.4	203	327	.	R	88.25	6/77	104	119	129	145	159	256	367	404	T4	.
4	4.4	214	344	.	R	88.45	6/77	100	116	131	151	170	266	379	428	T4	.
5	4.5	.	.	.	U	88.05	6/86	.	.	.	.	.	.	.	.	X1	.
6	6.2	211	364	1.20	R	89.50	8/81	90	97	118	140	162	274	.	428	B7	.
7	6.3	205	305	3.34	R	86.50	8/76	102	131	147	165	178	241	327	376	S9	.
8	6.3	212	349	.	R	89.20	6/76	96	117	131	148	166	272	379	420	Q4	.
9	6.4	205	306	0.01	U	85.80	8/81	106	122	134	152	167	251	331	384	T4	.
10	6.5	202	307	.	R	87.10	8/76	100	119	134	145	163	248	338	374	T4	.
11	6.5	210	362	0.51	R	89.55	7/78	92	104	113	131	153	281	382	407	W3	.
12	6.7	210	325	1.78	R	89.60	8/76	102	119	130	146	166	261	356	401	S1	.
13	6.8	205	339	.	R	87.75	8/78	95	109	120	139	159	265	373	390	T4	.
14	6.8	207	341	0.76	R	88.70	7/78	87	99	116	137	159	264	374	407	W3	.
15	6.9	213	336	.	R	85.95	8/79	106	126	139	159	176	258	372	391	U7	.
16	7.0	201	299	0.01	U	90.90	6/76	90	115	128	147	164	235	328	380	Y1	.
17	7.0	206	331	.	U	86.60	7/84	87	101	113	130	153	265	354	383	B4	.
18	7.0	212	336	0.48	R	89.50	8/76	96	117	128	148	167	263	.	434	S4	.
19	7.0	212	331	.	R	88.85	8/77	98	124	139	155	173	258	359	392	T4	.
20	7.0	212	342	.	R	87.75	8/77	108	122	132	149	167	266	380	428	U7	.
21	7.0	215	327	0.01	U	88.85	6/76	97	119	128	146	155	272	360	399	Y1	.

ATTACHMENT I

1

PHOENIX

JUNE 1981

PREMIUM GASOLINE

Brand	ARCO	CHEVRON	EXXON	GIANT	MOBIL	SHELL	TASCO	TEXACO	VICKERS
Type	Unleaded	Unleaded	Unleaded	Leaded	Unleaded	Unleaded	Unleaded	Unleaded	Leaded
API Gravity @ 60°F	54.7	56.9	53.1	54.2	56.7	56.0	57.1	51.7	57.1
D86 Dist. - IBP	88	92	89	90	92	90	92	89	90
5%	110	116	108	107	111	103	111	109	112
10%	129	133	135	124	130	130	128	130	125
20%	159	150	165	148	156	156	148	162	147
30%	187	184	191	172	179	182	167	192	170
50%	228	223	236	222	217	222	217	236	218
70%	264	256	271	278	256	261	276	271	269
90%	322	313	322	339	322	313	355	323	338
95%	360	351	349	379	362	367	389	358	370
End Point	412	414	392	436	412	420	428	412	428
W.U.N.	399	392	409	396	388	390	399	408	393
F.I.A. % A	37.0	32.0	39.5	35.0	31.5	34.5	30.0	45.5	32.5
% O	8.5	10.0	3.0	1.5	9.0	9.5	9.5	4.5	0.0
% S	54.5	58.0	57.5	63.5	59.5	56.0	60.5	50.0	67.5
Vapor Pressure, psi	8.2	8.2	7.8	8.3	8.1	8.0	7.9	8.4	8.7
Lead, g/gal	0.006	0.015	0.008	0.88	0.003	<0.001	0.007	0.006	1.59
Sulfur, ppm	238	182	94	82	331	303	438	201	53
T V/L Ratio @ 20:1, °F	147.6	147.9	149.3	143.1	146.2	147.7	144.3	147.8	141.8
Research Octane	96.5	95.9	95.9	96.1	96.5	96.9	92.6	96.1	95.8
Motor Octane	85.7	85.7	86.0	88.2	85.8	85.8	84.0	85.3	88.7
Benzene	1.29	1.53	1.71	1.16	1.65	1.82	1.25	1.50	1.36

PHOENIX JUNE 1981

UNLEADED GASOLINE

Brand	ARCO	CHEVRON	EXXON	GIANT	MOBIL	SHELL	TASCO	TEXACO	UNION	VICKERS
API Gravity @ 60°F	57.8	56.9	56.1	56.7	57.7	57.2	57.8	56.9	57.0	57.1
D86 Dist. - IBP	92	90	92	95	92	90	88	91	86	91
5%	111	106	115	115	108	104	111	111	105	115
10%	127	122	127	130	123	126	126	126	121	126
20%	149	142	147	149	149	152	148	150	147	147
30%	170	160	167	168	155	176	170	176	171	165
50%	215	203	206	210	224	222	216	222	219	212
70%	264	256	258	260	274	272	266	272	268	260
90%	339	301	321	332	352	339	343	344	341	333
95%	373	341	352	366	382	383	373	378	383	369
End Point	418	392	400	412	420	418	416	424	428	426
W.U.N.	391	363	376	385	403	397	393	399	393	385
F.I.A. % A	31.5	34.0	33.5	30.5	26.5	29.0	28.5	31.0	32.5	30.5
% O	7.0	1.5	10.0	10.0	9.0	9.0	9.5	9.5	9.5	10.5
% S	61.5	64.5	56.5	59.5	65.5	62.0	62.0	59.5	58.0	59.0
Vapor Pressure, psi	8.7	8.5	8.4	8.2	8.0	8.4	8.5	9.0	8.7	8.5
Lead, g/gal	0.004	0.003	0.007	0.007	0.005	0.004	0.004	0.003	0.002	0.008
Sulfur, ppm	245	67	194	230	379	316	283	267	201	221
T V/L Ratio @ 20:1, °F	142.0	140.6	141.9	143.8	144.9	144.8	143.8	141.9	141.6	143.3
Research Octane	92.1	91.2	92.7	92.5	91.6	91.9	92.1	93.6	94.9	92.5
Motor Octane	82.9	82.8	82.6	82.7	82.8	82.8	82.9	82.7	84.9	82.7
Benzene	1.52	1.65	2.27	2.07	0.98	1.18	1.17	1.07	0.89	1.96
Oleylamine, #/MB									5.99	

BAKERSFIELD

JUNE 1981

PREMIUM GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
Type	Unleaded	Unleaded	Unleaded	Unleaded	UNLeaded	Leaded
API Gravity @ 60°F	46.8	51.7	53.5	55.5	51.7	55.5
D86 Dist. - IBP	96	95	92	94	105	91
5%	120	117	100	101	134	110
10%	137	130	128	127	154	130
20%	165	160	155	151	179	156
30%	192	188	184	176	202	180
50%	244	233	227	229	244	224
70%	296	273	272	284	283	270
90%	342	323	311	349	333	327
95%	382	350	379	387	355	363
End Point	436	406	427	414	413	417
W.U.N.	425	405	393	408	430	397
F.I.A. % A	54.0	44.0	41.5	33.5	44.5	40.0
% O	0.0	3.0	4.5	6.5	3.5	5.0
% S	46.0	53.0	54.0	60.0	52.0	55.0
Vapor Pressure, psi	7.5	7.8	8.0	8.0	8.5	8.1
Lead, g/gal	0.008	<0.001	<0.001	<0.001	<0.001	1.65
Sulfur, ppm	10	115	145	376	174	132
T V/L Ratio @ 20:1, °F	155.0	146.7	147.4	146.6	146.4	147.4
Research Octane	96.9	96.6	96.7	92.0	97.1	96.7
Motor Octane	86.0	85.8	86.0	82.6	86.0	86.0
Benzene	3.43	1.96	2.04	0.84	3.92	1.89
Oley.amine, #/MB						2.82

BAKERSFIELD

JUNE 1981

LEADED REGULAR GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO
API Gravity @ 60°F	54.5	53.9	55.3	54.9	58.2
D86 Dist. - IBP	98	98	96	100	98
5%	115	128	112	118	111
10%	133	146	128	128	124
20%	155	173	148	150	141
30%	175	197	171	174	158
50%	228	236	232	230	203
70%	244	283	285	289	262
90%	294	340	344	349	324
95%	361	360	374	379	357
End Point	405	394	414	418	392
W.U.N.	391	421	410	410	372
F.I.A. % A	32.0	34.0	33.0	33.0	29.5
% O	0.0	0.0	8.0	9.0	6.5
% S	68.0	66.0	59.0	58.0	64.0
Vapor Pressure, psi	7.7	7.8	7.9	8.1	8.5
Lead, g/gal	1.29	1.07	0.40	0.38	1.01
Sulfur, ppm	71	25	1121	1121	797
T V/L Ratio @ 20:1, °F	150.6	157.0	145.2	145.4	139.0
Research Octane	91.2	90.7	92.8	92.8	92.7
Motor Octane	85.5	85.1	83.8	83.9	84.6
Benzene	1.88	1.03	0.77	0.79	1.08

BAKERSFIELD JUNE 1981

UNLEADED GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
API Gravity @ 60°F	51.9	51.2	56.7	52.5	55.8	51.7
D86 Dist. - IBP	101	98	88	94	88	92
5%	117	120	105	110	102	109
10%	132	137	120	131	125	124
20%	157	166	141	157	145	146
30%	179	187	163	183	167	169
50%	237	232	217	227	218	220
70%	287	279	272	275	274	274
90%	354	333	341	325	335	336
95%	383	376	367	369	365	366
End Point	428	407	412	418	408	403
W.U.N.	420	410	390	400	392	393
F.I.A. % A	40.5	43.0	32.5	38.0	35.5	28.5
% O	0.0	0.0	6.0	7.9	5.0	8.0
% S	59.5	57.0	61.5	55.5	59.5	63.5
Vapor Pressure, psi	7.7	8.0	8.5	7.0	8.8	7.2
Lead, g/gal	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	18	6	247	149	201	132
T V/L Ratio @ 20:1, °F	151.3	151.1	143.4	149.7	140.9	143.8
Research Octane	90.7	93.1	92.0	96.7	92.1	96.6
Motor Octane	82.2	83.4	82.8	86.1	82.9	86.9
Benzene	2.41	1.75	0.84	1.94	1.33	0.81
Oleylamine, #/MB						5.99

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SAN FRANCISCO AREA

JUNE 1981

PREMIUM GASOLINE

Brand	ALLIANCE	ARCO	BEACON	CHEVRON	EXXON	JIFFY	LION	MOBIL	SHELL	TEXACO	UNION
Type	Leaded	Unleaded	Leaded	Unleaded	Unleaded	Leaded	Unleaded	Unleaded	Unleaded	Unleaded	Leaded
API Gravity @ 60°F	58.1	55.0	59.7	56.0	56.1	56.0	54.0	52.9	57.7	55.1	59.1
D86 Dist. - IBP	96	94	88	95	95	92	92	95	93	92	92
5%	116	121	102	115	110	109	110	117	115	112	111
10%	132	140	117	137	131	127	132	138	135	135	124
20%	157	168	133	167	155	151	158	169	160	163	140
30%	181	191	149	192	180	175	185	197	185	190	158
50%	223	230	185	235	224	217	234	242	218	236	197
70%	266	267	235	269	263	254	276	278	253	277	248
90%	327	327	308	314	338	324	327	319	306	343	319
95%	361	353	346	352	365	350	363	356	361	376	351
End Point	402	400	401	412	405	403	415	405	412	420	399
W.U.N.	397	407	345	407	401	388	408	416	386	417	364
F.I.A. % A	27.5	36.0	28.5	35.5	35.5	30.5	40.5	43.5	31.5	35.5	29.0
% O	6.5	0.0	0.0	11.5	0.0	5.5	9.0	8.0	7.5	10.0	0.0
% S	66.0	64.0	71.5	53.0	64.5	64.0	50.5	48.5	61.5	54.5	71.0
Vapor Pressure, psi	7.4	6.9	8.3	8.7	7.4	7.3	8.9	8.4	8.0	8.1	8.7
Lead, g/gal	0.60	0.006	1.61	0.005	0.009	0.44	0.005	0.002	0.003	0.002	1.21
Lead Alkyl	RM25	----	90% RM50 10% TEL	----	----	TEL	----	----	----	----	RM50
Sulfur, ppm	119	13	77	29	25	235	72	19	52	160	7
T V/L Ratio @ 20:1, °F	145.8	155.1	139.2	150.3	151.9	151.2	144.4	150.0	148.6	151.8	139.6
Research Octane	94.5	95.3	95.3	96.9	95.1	94.6	96.1	97.2	97.0	96.9	95.5
Motor Octane	86.7	86.7	89.0	85.6	86.4	85.7	85.1	86.0	86.5	85.9	89.1
Benzene	1.50	2.40	1.20	1.21	2.33	1.63	1.35	1.52	1.66	0.88	1.39
Oleylamine, #/MB											11.4

SAN FRANCISCO AREA

JUNE 1981

LEADED REGULAR GASOLINE

Brand	ALLIANCE	ARCO	BEACON	CHEVRON	EXXON	JIFFY	LION	MOBIL	SHELL	TEXACO
API Gravity @ 60°F	60.2	60.8	58.2	60.1	60.1	55.6	57.0	60.6	53.7	59.0
D86 Dist. - IBP	92	92	94	96	100	98	93	85	98	100
5%	111	112	113	113	112	108	108	111	114	120
10%	125	128	127	126	124	135	124	129	125	139
20%	148	146	149	147	140	163	148	148	145	167
30%	174	166	170	169	164	189	173	168	167	192
50%	220	207	216	209	205	232	216	211	218	238
70%	269	258	264	262	256	278	268	261	271	287
90%	338	334	346	326	338	354	349	328	353	348
95%	366	364	372	352	373	400	374	353	375	370
End Point	407	412	430	399	408	435	428	394	422	429
W.U.N.	395	382	394	380	379	417	394	384	399	422
F.I.A. % A	22.5	21.0	23.5	18.5	22.5	27.5	26.5	18.0	30.5	22.5
% O	8.5	12.0	10.5	0.0	11.5	10.0	10.0	0.0	11.0	8.5
% S	69.0	67.0	66.0	81.5	66.0	62.5	63.5	82.0	58.5	69.0
Vapor Pressure, psi	8.6	8.2	8.0	7.3	7.8	7.8	8.6	8.3	7.8	7.5
Lead, g/gal	1.35	0.90	1.08	1.13	0.82	0.88	0.80	1.11	1.24	0.90
Lead Alkyl	RM-24	TEL	90% RM50 10% TEL	RM25	25% RM50 75% TEL	TEL	RM25	RM25	RM25	TEL
Sulfur, ppm	234	143	185	89	141	440	417	88	263	431
T V/L Ratio @ 20:1, °F	143.0	142.8	146.6	141.8	144.0	150.8	144.7	142.4	151.1	143.6
Research Octane	92.4	92.2	92.5	92.1	92.0	93.2	93.1	92.0	93.2	91.6
Motor Octane	85.0	84.5	84.7	84.4	84.5	83.9	83.6	83.9	83.4	84.6
Benzene	1.05	1.25	1.37	1.09	1.30	1.02	0.94	1.08	1.06	0.80

SAN FRANCISCO AREA

JUNE 1981

UNLEADED GASOLINE

Brand	ALLIANCE	ARCO	BEACON	CHEVRON	EXXON	JIFFY	LION	MOBIL	SHELL	TEXACO	UNION
API Gravity @ 60°F	57.3	56.0	55.9	53.9	56.9	57.2	57.1	54.0	56.5	54.7	53.4
D86 Dist. - IBP	90	95	96	98	85	98	94	95	98	92	92
5%	115	113	113	117	107	114	113	115	117	114	109
10%	128	133	126	137	129	129	131	135	131	133	126
20%	152	157	137	166	153	152	134	165	153	162	149
30%	175	179	146	192	175	175	173	189	174	189	175
50%	217	225	207	235	217	217	217	238	222	235	228
70%	266	268	259	277	285	269	263	275	274	285	283
90%	336	328	329	332	326	340	331	332	347	354	342
95%	368	356	357	358	354	369	363	362	377	380	372
End Point	418	404	400	409	412	410	407	406	427	429	413
W.U.N.	392	400	379	413	389	394	392	415	402	419	404
F.I.A. % A	29.5	33.0	33.5	35.5	30.0	28.5	28.5	35.0	31.0	30.0	40.0
% O	6.0	4.0	5.5	4.0	4.5	6.0	6.5	4.0	7.0	6.5	0.0
% S	64.5	63.0	61.0	60.5	65.5	65.5	65.0	61.0	62.0	63.5	60.0
Vapor Pressure, psi	8.2	8.5	9.0	8.0	8.2	8.4	8.4	8.4	8.0	8.1	8.6
Lead, g/gal	<0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	142	39	109	24	78	122	124	31	162	171	6
T V/L Ratio @ 20:1, °F	145.3	146.4	135.6	149.0	147.0	144.8	144.1	148.4	146.0	149.3	144.3
Research Octane	91.3	91.3	95.6	91.8	91.4	91.6	91.5	91.6	92.7	92.1	94.7
Motor Octane	^ 82.9	82.9	85.1	83.0	83.0	83.0	82.9	83.3	83.4	82.9	84.6
Benzene	1.94	2.06	10.14	1.73	2.01	1.86	1.87	1.79	1.31	0.97	1.0
Oleylamine, #MB											11.0

LOS ANGELES AREA

PREMIUM GASOLINE

JUNE 1981

Brand	ARCO	CHEVRON	EXXON	GASCO	LERNER	MOBIL	SHELL	TEXACO	THRIFTY	UNION	WORLD	WORLD
Type	Unleaded	Unleaded	Unleaded	Leaded	Leaded	Unleaded	Unleaded	Unleaded	Leaded	Leaded	Leaded	Leaded
API Gravity @ 60°F	57.2	50.8	51.8	58.3	58.1	56.4	55.9	54.0	55.8	53.3	55.9	52.7
D86 Dist. - IBP	86	86	86	88	86	88	87	87	88	87	87	88
5%	110	105	109	110	106	106	108	106	115	107	111	100
10%	130	126	124	125	120	123	126	127	134	125	126	134
20%	156	161	154	147	138	150	152	167	162	150	151	167
30%	184	192	184	170	159	178	176	201	186	174	175	197
50%	224	234	240	214	213	221	219	243	230	221	224	237
70%	257	266	284	261	288	261	259	282	270	275	275	278
90%	310	310	340	340	338	329	321	337	328	335	336	313
95%	346	337	374	375	362	367	357	363	355	372	366	359
End Point	388	383	419	419	410	413	407	401	403	427	405	397
W.U.N.	391	400	415	389	385	392	388	418	405	395	398	406
F.I.A. % A	30.5	48.0	46.0	27.0	29.5	34.0	34.5	37.0	30.5	39.0	30.0	39.0
% O	10.5	4.5	9.0	11.0	4.5	6.5	12.0	3.5	8.5	0.0	5.0	2.5
% S	59.0	47.5	45.0	62.0	66.0	59.5	53.5	59.5	61.0	61.0	65.0	58.5
Vapor Pressure, psi	8.6	8.7	8.6	8.6	8.8	8.6	8.3	8.2	7.9	8.7	8.5	8.2
Lead, g/gal	0.006	0.004	0.002	0.51	1.22	<0.001	0.003	<0.001	1.45	0.95	0.95	1.50
Lead Alkyl	-----	-----	-----	TEL	30% RM25 70% TEL	-----	-----	-----	-----	RM50	40% RM50 60% TEL	90% RM50 10% TEL
Sulfur, ppm	181	49	230	640	221	374	327	50	202	14	527	26
T V/L Ratio @ 20:1, °F	144.8	146.0	142.6	142.1	139.2	142.4	143.1	152.0	149.8	141.6	143.8	151.0
Research Octane	96.9	96.7	97.2	94.6	92.1	96.5	97.3	97.1	96.0	97.0	92.3	96.4
Motor Octane	85.8	85.5	85.3	85.2	85.6	86.0	85.7	86.8	87.5	88.8	84.7	88.1
Benzene	1.36	1.83	1.18	1.29	0.99	1.78	1.77	0.87	1.87	1.50	1.27	2.15
Oleylamine, #/MB										10.2		

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LOS ANGELES AREA

LEADED REGULAR GASOLINE

JUNE 1981

Brand	ARCO	CHEVRON	EXXON	GASCO	LERNER	MOBIL	SHELL	TEXACO	THRIFTY	WORLD
API Gravity @ 60°F	60.3	60.3	59.9	58.2	58.1	54.9	55.6	56.4	58.4	56.9
D86 Dist. - IBP	89	89	89	89	85	86	87	86	88	88
5%	110	113	100	111	108	104	112	103	107	103
10%	124	127	119	123	122	122	128	123	121	121
20%	143	143	137	142	142	146	152	153	140	144
30%	162	159	155	161	163	171	176	181	160	168
50%	208	198	200	214	213	225	228	235	208	228
70%	267	249	264	281	281	280	288	283	268	298
90%	354	314	344	363	344	348	364	335	340	338
95%	393	355	388	396	369	381	399	361	370	378
End Point	438	405	423	432	424	421	439	394	413	420
W.U.N.	388	365	374	396	388	402	413	408	381	401
F.I.A. % A	22.0	25.5	24.5	23.5	27.0	33.5	28.5	28.0	26.5	28.5
% O	11.0	6.5	11.0	13.0	5.0	10.5	10.5	2.5	9.0	3.0
% S	67.0	68.0	64.5	63.5	68.0	56.0	61.0	69.5	64.5	68.5
Vapor Pressure, psi	8.6	8.2	8.9	8.5	8.6	8.2	8.0	8.9	8.8	8.8
Lead, g/gal	1.41	1.14	2.03	1.11	1.11	0.26	0.92	1.18	0.90	1.25
Lead Alkyl	TEL	RM25	25% RM50 75% TEL	TEL	RM25	RM50	RM25	TEL	RM25	TEL with TCE Tracer
Sulfur, ppm	716	102	854	924	255	600	421	444	541	259
T V/L Ratio @ 20:1, °F	139.8	141.8	136.6	140.6	141.6	147.3	145.6	144.0	138.6	141.2
Research Octane	91.9	91.7	92.3	91.5	91.5	92.9	93.0	92.0	92.3	91.6
Motor Octane	84.6	85.4	84.9	83.8	84.8	83.6	83.9	84.4	84.2	85.0
Benzene	1.35	1.81	1.25	1.23	1.04	1.28	0.76	0.56	1.55	0.75

LOS ANGELES AREA — JUNE 1981

UNLEADED GASOLINE

Brand	ARCO	CHEVRON	EXXON	GASCO	LERNER	MOBIL	SHELL	TEXACO	THRIFTY	UNION	WORLD
API Gravity @ 60°F	57.9	56.2	56.3	56.8	54.8	57.8	57.1	54.4	56.5	57.0	54.8
D86 Dist. - IBP	88	88	85	86	86	86	86	86	86	84	86
5%	109	115	107	108	106	109	111	108	107	104	110
10%	124	125	124	123	123	126	130	124	123	119	129
20%	144	145	149	147	148	152	158	147	145	145	156
30%	162	166	174	170	176	179	184	171	167	171	182
50%	205	215	223	215	230	229	228	220	213	219	229
70%	249	267	275	264	285	279	269	291	259	266	270
90%	311	333	349	331	339	352	341	358	324	338	322
95%	341	365	379	360	361	380	374	380	355	380	358
End Point	383	412	415	409	416	412	418	414	401	426	400
W.U.N.	370	388	401	386	404	409	406	401	382	391	400
F.I.A. % A	32.0	34.0	32.5	32.5	10.0	25.5	26.0	34.0	33.0	30.5	35.5
% O	10.5	3.5	5.5	8.5	0.5	7.5	10.5	1.5	7.5	8.5	6.5
% S	57.5	62.5	62.0	59.0	89.5	67.0	63.5	64.5	59.5	61.0	58.0
Vapor Pressure, psi	8.5	8.6	8.7	8.8	8.6	8.0	8.3	8.6	8.7	9.0	8.7
Lead, g/gal	<0.001	0.010	<0.001	0.002	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.002
Sulfur, ppm	185	98	135	213	69	429	282	92	201	198	217
T V/L RAtio @ 20:1, °F	140.6	142.2	141.5	140.6	142.5	144.1	141.4	144.2	141.2	139.4	143.8
Research Octâne	93.6	91.9	91.9	92.7	91.6	91.4	91.8	92.1	92.8	94.9	93.1
Motor Octane	83.0	83.1	83.1	83.0	83.0	82.8	82.7	83.0	82.9	84.4	83.2
Benzene	2.16	1.69	1.73	1.64	1.19	0.82	0.78	1.09	2.05	0.81	1.63
Oleylamine, #/MB										9.41	

UNION 76 UNLEADED [illegible]ULAR GASOLINES

JUNE 1, 1982

Brand	UNION 76	L.A.	Orange	Sunny Hills	Richmond	Brisbane	San Jose	Bakers-field	Phoenix	Portland	Honolulu
Type	UNLEADED REGULAR										
API Gravity @ 60°F		58.6	56.3	57.3	51.0	51.7	51.6	52.3	53.4	55.3	55.1
D86 Dist. - IBP		84	85	86	86	84	83	88	82	86	90
5%		105	105	106	105	106	104	116	104	113	114
10%		123	125	126	123	128	126	135	115	126	128
20%		147	154	153	154	157	156	164	155	144	146
30%		161	182	180	182	186	184	190	187	168	165
50%		211	228	226	235	238	237	232	236	214	210
70%		254	278	274	284	286	286	274	282	260	257
90%		326	346	346	332	337	333	335	339	320	313
95%		355	377	377	359	367	366	364	369	348	343
End Point		405	430	416	421	415	423	413	414	388	376
W.U.N.		380	405	404	407	414	410	410	406	383	377
F.I.A. % A		29.0	32.5	29.5	45.0	42.5	44.0	40.5	37.0	40.5	39.5
% O		6.0	5.5	6.0	0.0	0.0	0.0	4.5	6.5	0.0	0.0
% S		65.0	62.0	64.5	55.0	57.5	56.0	55.0	56.5	59.5	60.5
Vapor Pressure, psi		8.7	9.0	8.6	8.5	8.9	8.9	8.0	8.6	9.8	10.0
Lead, g/gal		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm		288	297	285	<5	8	8	187	296	13	<5
T V/L Ratio @ 20:1, °F		142.2	143.9	144.6	146.7	145.0	144.7	151.0	146.0	135.9	133.3
Research Octane		94.2	94.2	93.9	94.6	94.2	94.2	96.5	95.2	94.0	93.6
Motor Octane		84.3	84.3	84.5	85.5	84.5	84.5	86.1	84.5	84.8	84.6
(R+M)/2		89.25	89.25	89.20	89.55	89.35	89.35	91.3	84.5	89.4	89.1
Oleylamine, #/MB		13.0	16.0	14.0	15.0	15.0	14.0	14.0	18.0	14.0	12.0
Benzene		0.90	0.94	0.72	1.57	1.41	1.42	2.24	0.98	4.00	4.25

UNION 76 SUPER L[illegible]ED GASOLINE

JUNE 1, 1982

Brand Type	UNION 76 SUPER	L.A.	Orange	Sunny Hills	Richmond	Brisbane	San Jose	Bakers-field	* Phoenix Leaded Reg.	Portland	Honolulu
API Gravity @ 60°F		56.2	55.7	54.5	56.1	61.1	59.5	53.8	58.5	59.2	70.2
D86 Dist. - IBP		86	89	84	88	84	84	89	85	80	83
5%		107	110	103	115	109	110	112	106	93	107
10%		123	120	122	127	120	123	129	122	112	120
20%		144	146	148	144	136	142	154	142	137	134
30%		166	168	172	161	151	160	179	161	160	148
50%		211	210	221	199	186	201	240	202	209	176
70%		266	266	276	257	237	260	295	268	255	203
90%		333	333	331	322	306	321	354	346	319	245
95%		368	367	366	351	345	353	383	378	355	276
End Point		420	432	415	400	391	398	427	424	395	316
W.U.N.		383	381	392	369	347	369	422	378	371	316
F.I.A. % A		34.0	35.5	37.0	30.0	24.5	30.0	35.5	30.0	31.0	11.0
% O		7.0	5.5	3.0	0.0	4.0	0.0	5.5	6.5	4.0	11.5
% S		59.0	59.0	60.0	70.0	71.5	70.0	59.0	63.5	65.0	77.5
Vapor Pressure, psi		8.7	8.5	8.6	8.7	8.9	8.9	7.7	8.6	10.6	10.3
Lead, g/gal		1.21	1.16	1.07	1.46	2.10	1.47	1.89	0.92	0.91	0.76
Lead Alkyl		RM50	RM50	RM50	RM50	75% RM50 25% TEL	90% RM50 10% TEL	TEL	RM25	90% RM50 10% TEL	TEL
Sulfur, ppm		301	246	154	7	38	12	676	405	173	119
T V/L Ratio @ 20:1, °F		141.9	141.8	144.4	138.4	137.9	140.8	151.6	141.8	128.9	126.4
Research Octane		97.0	96.8	96.1	95.5	95.4	95.7	96.3	92.2	96.4	95.9
Motor Octane		87.8	87.8	87.9	89.1	89.3	89.0	87.4	84.2	88.2	88.7
(R+M)/2		92.40	92.30	92.00	92.30	92.35	92.35	91.85	88.2	92.3	92.3
Oleylamine, #/MB		15.0	17.0	14.0	16.0	12.0	17.0	19.0	3.0	8.0	10.0
Benzene		1.15	1.39	1.12	0.87	0.99	0.81	0.90	0.97	2.04	1.14

UNION 76 SUPER*

September, 1982

	Los Angeles	Orange	Sunny Hills	Richmond	Brisbane	San Jose	Bakers-field	* Phoenix Regular	Portland	Honolulu
API Gravity @ 60°F	55.2	57.0	54.2	58.2	57.9	58.2	55.2	57.6	61.8	62.1
D 86 Dist. - IBP	89	91	88	85	90	85	89	91	87	85
5%	109	107	105	106	107	105	109	111	103	107
10%	123	122	121	123	123	121	126	125	115	118
20%	146	143	142	141	142	141	150	145	130	132
30%	169	162	166	159	160	161	175	162	146	149
50%	216	202	215	199	200	201	232	211	183	183
70%	270	253	280	253	257	259	286	282	231	228
90%	334	312	344	328	330	330	345	367	322	290
95%	364	347	373	365	364	365	373	395	358	316
End Point	413	407	422	425	414	413	413	431	410	378
W.U.N.	388	366	390	369	371	371	409	396	347	338
F.I.A. % A	36.5	33.5	38.5	29.5	32.0	32.0	32.5	32.0	24.5	25.5
% O	1.5	1.0	1.0	0.0	0.0	0.0	6.0	7.5	0.0	9.5
% S	62.0	65.5	60.5	70.5	68.0	68.0	61.5	60.5	75.5	65.0
Vapor Pressure, psi	8.4	8.6	8.1	8.7	8.6	8.8	8.3	8.0	10.0	9.8
Lead, g/gal	0.96	1.01	1.00	1.32	1.30	1.34	2.03	0.88	1.41	1.07
Lead Alkyl	RM50	RM50	RM50	85% RM50 15% PM50	80% RM50 20% PM50	80% RM50 20% PM50	TEL	80% RM50 20% TEL	80% RM50 20% PM50	5% RM25 95% TEL
Sulfur, ppm	66	56	52	17	8	12	555	416	70	145
T V/L Ratio @ 20:1,°F	143.0	141.3	143.2	138.5	138.7	138.0	146.0	142.1	128.7	130.0
Research Octane	96.4	96.0	96.2	95.4	95.4	95.4	96.1	92.4	95.2	96.3
Motor Octane	88.6	88.6	88.3	88.8	88.9	89.0	87.1	84.0	88.9	87.8
(R+M)/2	92.5	92.3	92.3	92.1	92.2	92.2	91.6	88.2	92.1	92.1
Oleylamine, #/MB	14	13	14	15	15	15	14	5	14	10
Benzene, wt %	1.76	1.61	1.81	1.32	1.27	1.31	1.02	1.21	1.34	3.57

UNION 76 UNLEADED

GASOLINES

JUNE 1, 1983

	Los Angeles	Orange	Sunny Hills	Richmond	Bur-lingame	Redwood City	Bakers-field	Phoenix	Portland	Honolulu
API Gravity @ 60°F	53.4	54.6	54.4	52.8	53.1	53.5	53.6	53.4	54.9	54.1
D 86 Dist. - IBP	90	92	87	94	93	89	92	93	80	90
5%	112	108	102	105	111	103	112	111	85	111
10%	131	128	123	119	126	120	129	130	108	130
20%	165	161	156	146	150	145	154	160	139	150
30%	196	189	186	174	175	172	182	189	168	169
50%	238	237	229	223	228	225	224	237	223	207
70%	289	290	279	288	277	275	264	290	278	246
90%	350	369	348	335	333	332	327	351	333	306
95%	388	418	387	377	362	365	362	383	360	319
End Point	435	465	434	424	414	418	415	433	416	357
W.U.N.	419	425	415	394	401	385	397	418	389	404
F.I.A. % A	38.0	35.0	35.0	42.0	42.0	40.5	40.0	37.5	39.5	44.4
% O	7.0	7.5	7.0	0.0	0.0	0.0	3.0	5.5	0.0	1.0
% S	55.0	57.5	58.0	58.0	58.0	59.5	57.0	57.0	60.5	55.0
Vapor Pressure, psi	8.6	8.3	8.6	8.7	8.6	8.6	8.0	7.0	10.4	9.3
Lead, g,gal	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<0.001
Sulfur, ppm	276	288	270	5.	<.5	9	180	207	<.5	<5
T V/L Ratio @ 20:1, °F	146.0	146.2	146.2	142.6	142.9	142.3	147.2	147.6	124.5	141.4
Research Octane	94.8	94.5	94.4	93.9	93.8	93.7	96.5	94.5	93.3	93.8
Motor Octane	84.3	84.3	84.2	84.2	84.3	84.4	86.3	84.3	84.2	84.5
(R+M)/2	89.6	89.4	89.3	89.0	89.0	89.0	91.4	89.4	88.8	89.2
Oleylamine, #/MB	8.	5.	10.	12.	15.	10.	9.	12.	8.	3.
Benzene	1.45	1.26	1.30	1.49	1.50	1.39	2.53	1.47	1.14	7.35

UNION 76 SUPER LEADED*

GASOLINES

JUNE 1, 1983

	Los Angeles	Orange	Sunny Hills	Richmond	Bur-lingame	Redwood City	Bakers-field	Phoenix* Regular	Portland	Honolulu
API Gravity @ 60°F	52.9	54.0	53.9	60.9	60.2	60.5	54.7	57.0	61.8	64.7
D-86 Dist. - IBP	88	90	87	94	92	95	92	95	84	89
5%	108	110	111	105	106	113	110	111	96	106
10%	125	128	127	117	120	123	123	125	112	116
20%	149	153	155	132	138	137	146	146	128	131
30%	169	177	180	147	152	151	170	167	146	145
50%	223	224	227	184	191	187	228	217	184	176
70%	282	276	281	240	249	241	283	279	230	222
90%	345	356	352	324	288	278	339	357	310	300
95%	382	392	390	365	373	357	369	389	345	358
End Point	424	438	443	422	417	389	412	420	392	404
W.U.N.	400	420	418	350	346	340	402	398	343	333
F.I.A. % A	39.0	32.0	35.0	27.5	27.5	27.0	34.0	28.5	26.0	18.5
% O	6.0	9.0	8.5	0.0	0.0	0.0	8.0	9.5	0.0	15.0
% S	55.0	59.0	56.5	72.5	72.5	73.0	58.0	62.0	74.0	66.5
Vapor Pressure, psi	8.4	8.3	8.4	9.0	9.0	8.4	8.0	8.2	11.3	9.7
Lead, g/gal	1.29	2.40	2.30	1.50	1.59	1.59	2.28	0.78	1.17	2.75
Lead Alkyl	RM-50	RM-25	RM-25	80%RM-50 20%PM-50	80%RM-50 20%PM-50	80%RM-50 20%PM-50	TEL	50%RM-50 50% TEL	80%RM-50 20%PM-50	TEL
Sulfur, ppm	201	456	422	12	8	17	973	515	<5.	323
T V/L Ratio @ 20:1, °F	144.8	147.1	146.0	134.5	136.1	136.1	144.0	142.4	122.4	129.4
Research Octane	96.9	97.0	97.1	94.7	95.1	95.0	97.0	92.7	95.2	96.5
Motor Octane	87.6	87.6	87.5	89.5	89.6	89.6	87.6	83.7	89.7	88.7
(R+M)/2	92.2	92.3	92.3	92.1	92.4	92.3	92.3	88.2	92.4	92.6
Oleylamine, #/MB	10.	7.	8.	13.	13.	13.	16.	6.	12.	6.
Benzene, wt %	2.10	1.25	1.28	0.94	0.98	0.95	1.34	1.32	1.34	1.75

UNION 76 UNLEADED

GASOLINE

SEPTEMBER 1983

Area	Los Angeles	Orange	Sunny Hills	Richmond	Burlin-game	San Jose	Bakers-field	Phoenix	Portland	Honolulu	Honolulu
API Gravity @ 60°F	53.6	57.2	54.9	52.9	52.3	52.4	51.9	52.7	53.9	52.8	54.6
D86 Dist. - IBP	90	90	85	86	88	88	89	88	86	85	89
5%	109	109	100	102	107	109	110	101	101	103	106
10%	121	126	120	122	123	127	128	117	118	121	119
20%	147	149	148	148	151	154	153	154	144	141	138
30%	175	172	175	174	178	182	184	188	170	161	157
50%	225	216	221	224	229	234	234	229	221	209	205
70%	275	258	272	278	281	286	281	276	273	257	257
90%	334	330	332	326	330	334	341	325	309	311	307
95%	370	365	369	360	365	367	375	361	357	333	329
End Point	422	420	415	414	412	429	420	408	402	398	378
W.U.N.	396	388	391	393	400	408	411	395	382	372	366
F. I. A. % A	39.5	31.0	36.0	42.0	42.5	42.5	44.5	40.5	42.5	45.5	43.0
% O	2.5	9.0	8.0	0.0	0.0	0.0	5.5	7.0	0.0	0.0	0.0
% S	58.0	60.0	56.0	58.0	57.5	57.5	50.0	52.5	57.5	54.5	57.0
Vapor Pressure	8.4	8.4	8.4	7.6	8.7	8.1	8.0	6.5	10.3	8.9	9.4
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	116	283	263	<5.	<5.	9	320	244	<5.	<5.	<5.
T V/L Ration @ 20:1, °F	142.7	140.6	143.9	142.9	142.9	143.8	144.3	148.7	135.6	143.3	135.6
Research Octane	94.4	94.9	95.3	94.2	94.1	94.1	97.4	95.1	93.8	93.8	93.6
Motor Octane	84.8	84.8	84.8	84.9	84.9	84.9	86.1	84.9	85.0	84.9	84.9
(R+M)/2	89.6	89.9	90.1	89.6	89.5	89.5	91.8	90.0	89.4	89.4	89.3
Oleylamine, #/MB	5.	3.	6.	6.	6.	5.	6.	5.	3.	13.	10.
Benzene, wt %	1.75	0.86	0.86	1.46	1.38	1.40	2.11	0.93	2.20	5.58	6.65

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UNION 76 SUPER LEADED

GASOLINE

SEPTEMBER 1983

Area	Los Angeles	Orange	Sunny Hills	Richmond	Burlin-game	San Jose	Bakers-field	Phoenix Lead.Reg	Portland	Honolulu	Honolulu
API Gravity @ 60°F	55.0	55.2	55.2	60.0	59.3	58.8	55.2	56.3	61.1	68.0	67.9
D86 Dist. - IBP	90	86	92	94	97	89	90	92	92	89	88
5%	111	108	110	110	115	107	109	111	106	106	104
10%	127	126	125	122	129	121	122	123	116	116	114
20%	148	145	147	136	144	136	145	147	133	128	126
30%	170	163	169	149	159	152	171	169	147	141	139
50%	219	210	212	184	193	191	225	219	180	175	170
70%	278	267	272	236	244	246	280	281	227	216	215
90%	349	332	340	313	311	320	341	310	315	284	282
95%	393	368	381	347	346	349	373	383	344	355	335
End Point	426	428	436	401	394	409	410	435	402	409	419
W.U.N.	398	383	383	348	360	357	399	383	342	327	320
F. I. A. % A	34.0	34.0	34.5	28.0	29.0	30.5	34.5	27.5	26.5	13.0	13.5
% O	1.0	1.5	1.5	0.0	0.0	0.0	4.0	13.0	0.0	22.0	22.0
% S	65.0	64.5	64.0	72.0	71.0	69.5	61.5	59.5	73.5	65.0	64.5
Vapor Pressure	7.0	8.4	8.5	8.4	8.5	8.4	8.5	6.6	9.7	10.2	10.2
Lead, g/gal	1.28	1.22	1.15	1.38	1.27	1.26	1.43	0.77	1.05	2.83	2.70
Lead Alkyl	RM-50	RM-50	RM-50	RM-50	RM-50	RM-50	TEL	RM-25	RM-50	TEL	TEL
Sulfur, ppm	43	64	82	15	16	16	510	353	8	226	234
T V/L Ration @ 20:1, °F	135.9	138.3	131.6	134.6	137.4	126.6	143.2	143.6	131.0	126.1	125.8
Research Octane	96.0	96.0	96.2	95.1	95.3	95.3	96.3	92.8	95.2	96.5	96.3
Motor Octane	88.6	88.5	88.3	89.3	89.0	89.3	87.9	84.4	89.7	88.2	88.0
(R+M)/2	92.3	92.3	92.3	92.2	92.2	92.3	92.1	88.6	92.5	92.4	92.2
Oleylamine, #/MB	5.	5.	5.	5.	5.	4.	8.	3.	6.	8.	6.
Benzene, wt %	2.05	1.98	2.02	1.03	1.11	1.18	1.34	0.91	1.71	0.72	0.78

UNION 76 UNLEADED

GASOLINES

JUNE 1, 1984

Area	Los Angeles	Orange	Sunny Hills	Richmond	Bur-lingame	San Jose	Bakers-field	Phoenix	Portland	Honolulu
API Gravity @ 60°F	56.4	56.1	56.0	52.1	52.1	54.1	56.4	55.1	57.6	55.3
D86 Dist. - IBP	88	96	90	92	83	96	89	86	82	91
5%	106	119	107	115	104	124	113	109	92	107
10%	126	134	125	128	121	145	126	126	111	119
20%	151	156	153	156	145	172	158	153	139	137
30%	178	178	181	183	169	191	188	177	164	154
50%	219	226	230	238	219	236	229	236	214	193
70%	260	271	275	287	266	277	268	290	260	241
90%	330	340	318	333	314	333	329	360	309	283
95%	370	374	374	381	350	365	359	394	362	305
End Point	432	424	430	434	408	420	426	435	397	418
W.U.N.	391	405	398	412	383	418	401	419	372	351
F. I. A. % A	33.0	33.5	33.0	44.0	44.5	36.5	33.5	34.0	33.0	42.5
% O	9.5	10.5	9.5	0.0	0.5	2.5	4.0	14.0	7.0	0.0
% S	57.5	56.0	57.5	56.0	55.0	61.0	62.5	52.0	60.0	57.5
Vapor Pressure	8.6	8.9	8.6	8.0	9.0	8.6	8.8	8.6	11.6	9.3
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	277	276	268	<5.	9.	55	183	168	220	<5.
T V/L Ration @ 20:1, °F	142.5	141.8	141.2	144.5	141.1	147.5	141.9	142.0	123.4	134.3
Research Octane	94.4	94.6	94.5	94.2	93.7	93.8	94.0	93.2	94.6	94.0
Motor Octane	84.3	84.4	84.4	84.5	84.3	84.7	84.7	82.9	84.4	84.6
(R+M)/2	89.4	89.5	89.5	89.4	89.0	89.3	89.5	88.1	89.5	89.3
Oleylamine, #/MB	8	7	7	7	3	3	4	7	6	12
Benzene, wt %	1.25	1.33	1.32	1.54	4.13	1.22	1.53	0.90	1.22	6.04

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Spec 87

UNION 76 SUPER LEADED*

GASOLINES

JUNE 3, 1984 should be 1985

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	* Anchorage regular	Bakers-field	Honolulu	* Phoenix regular	Portland
API Gravity @ 60°F	51.5	51.3	51.7	55.2	55.5	55.0	64.4	53.1	65.0	55.4	62.6
D86 Dist. - IBP	98	103	108	88	87	87	79	90	86	89	78
5%	112	116	116	104	110	99	92	98	102	112	90
10%	132	134	134	120	127	122	104	123	114	126	103
20%	158	161	166	143	147	145	122	146	129	149	122
30%	186	189	195	164	167	168	140	170	144	170	141
50%	232	236	242	211	215	216	174	227	181	219	181
70%	277	278	279	265	267	268	212	285	226	276	235
90%	325	322	315	328	330	330	271	350	298	344	324
95%	354	352	349	358	362	359	301	390	358	380	361
End Point	410	414	416	426	409	416	333	433	413	421	413
W.U.N.	405	409	413	380	388	387	317	405	337	396	341
F.I.A. % A	47.5	43.0	41.5	36.0	34.5	36.0	25.5	38.0	14.0	32.0	24.0
% O	1.0	1.0	1.0	0.5	1.0	0.5	1.5	5.5	31.0	3.5	0.0
% S	51.5	56.0	57.5	63.5	64.5	63.5	73.0	56.5	55.0	64.5	76.0
Vapor Pressure	7.6	8.2	8.3	8.6	8.5	8.5	13.0	8.0	10.0	8.4	11.3
Lead, g/gal	0.19	0.21	0.25	0.40	0.40	0.34	0.81	0.59	2.10	0.23	0.74
Lead Alkyl	90% RM50 10% TEL	80% RM50 20% TEL	RM50	RM25	RM25	RM25	RM25	TEL	TEL	65% RM50 35% TEL	75% RM50 25% TEL
MMT, gm/gal	0.05	0.06	0.07								
Sulfur, ppm	35	35	12	18	9	12	<5	121	505	193	13
T V/L Ratio @ 20:1, °F	148	149	145	141	140	140	115	145	126	144	117
Research Octane	97.0	97.0	96.8	95.9	95.8	95.2	89.7	97.0	99.4	92.7	94.6
Motor Octane	85.3	85.4	85.7	86.8	86.8	86.7	86.9	85.7	86.8	83.2	88.5
(R+M)/2	91.2	91.2	91.2	91.4	91.4	91.0	88.3	91.4	93.1	88.0	91.6
Oleylamine, #/MB	5	5	6	7	6	5	11	0	7	9	6
Benzene, wt %	2.2	2.1	2.1	1.7	1.6	1.8	4.2	2.1	0.7	2.1	1.4
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	LAR/SFR	Chevron	LAR	LAR/SFR

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UNION 76 UNLEADED

GASOLINES

JUNE 3, 1985

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60°F	53.1	54.5	52.8	55.0	54.6	54.7	60.5	51.5	57.2	53.4	56.5
D86 Dist. - IBP	92	91	86	88	90	92	78	87	88	88	80
5%	114	112	112	112	116	111	90	97	102	108	91
10%	131	129	119	126	128	124	106	121	116	125	112
20%	158	153	157	146	150	147	126	151	130	151	138
30%	182	176	183	166	171	168	145	179	144	177	164
50%	229	222	230	218	220	219	189	228	179	233	218
70%	270	268	273	274	280	264	237	275	223	299	278
90%	325	324	326	332	337	334	278	340	266	354	325
95%	353	350	351	357	364	361	312	376	286	384	379
End Point	420	408	407	410	423	410	340	424	354	438	418
W.U.N.	402	394	398	391	396	392	334	401	324	413	382
F.I.A. % A	40.5	38.0	41.5	36.5	37.0	37.0	35.5	42.0	40.0	37.0	35.0
% O	1.0	2.5	1.0	0.5	1.0	1.0	0.0	5.0	0.0	0.5	1.0
% S	58.5	59.5	57.5	63.0	62.0	62.0	64.5	53.0	60.0	62.5	64.0
Vapor Pressure	7.8	8.5	8.7	8.5	7.8	8.7	12.7	8.0	10.4	8.4	10.8
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	30	125	31	10	<5	29	<5	96	<5	44	9
T V/L Ratio @ 20:1, °F	144	144	145	141	139	142	114	148	128	145	123
Research Octane	94.0	94.0	94.4	94.0	94.1	94.1	91.3	95.0	93.9	91.5	93.8
Motor Octane	84.3	83.8	84.5	84.6	84.6	84.7	83.7	83.7	84.5	82.5	84.3
(R+M)/2	89.2	88.9	89.4	89.3	89.4	89.4	87.5	89.4	89.2	87.0	89.0
Oleylamine, #/MB	6	6	6	6	7	5	12	1	11	6	6
Benzene, wt %	2.6	2.4	2.5	1.2	1.2	1.2	5.6	2.1	8.8	2.1	1.6
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	LAR/SFR	Chevron 11/21	LAR	LAR/SFR

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UNION 76 SUPER LEADED*

GASOLINES

SEPTEMBER 3, 1985

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	* Anchorage regular	Bakers-field	Honolulu	* Phoenix regular	Portland
API Gravity @ 60'F	53.6	52.8	53.0	53.5	53.1	53.4	61.4	54.4	63.2	56.0	62.4
D86 Dist. - IBP	101	84	97	95	91	95	86	95	86	93	82
5%	120	104	112	116	112	107	93	122	99	101	96
10%	135	123	127	131	125	120	108	134	111	120	109
20%	156	148	153	148	147	142	128	155	126	138	131
30%	181	175	178	163	170	166	144	174	140	156	153
50%	218	225	229	211	222	217	181	210	177	203	193
70%	275	277	283	268	279	276	216	260	215	273	234
90%	330	334	338	325	333	332	268	319	262	342	332
95%	361	362	377	350	364	365	298	342	296	370	358
End Point	425	428	435	412	416	426	346	396	354	408	410
W.U.N.	394	397	404	384	395	387	323	382	319	377	358
F.I.A. % A	40.0	40.0	41.5	39.0	41.0	41.0	28.0	34.0	26.0	30.0	19.0
% O	0.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	13.0	3.5	0.0
% S	59.5	60.0	57.5	61.0	59.0	59.0	72.0	66.0	61.0	66.5	81.0
Vapor Pressure	7.0	9.0	9.0	8.2	6.6	7.8	10.9	8.3	10.4	7.5	10.4
Lead, g/gal	0.14	0.13	0.13	0.47	0.44	0.46	0.40	0.91	0.85	0.20	0.15
Lead Alkyl	50% RM50 50% TEL	50% RM50 50% TEL	50% RM50 50% TEL	RM25	RM25	RM25	RM25	TEL	TEL	40% RM50 60% TEL	50% RM50 50% TEL
MMT, gm/gal	0.09	0.08	0.08				<0.01	<0.01		0.07	
Sulfur, ppm	49	53	74	12	<5	9	11	22	120	143	82
T V/L Ratio @ 20:1, 'F	141	145	143	141	143	140	120	148	127	143	130
Research Octane	96.1	96.1	96.1	95.7	96.0	95.9	90.4	95.0	98.0	92.9	94.5
Motor Octane	85.8	85.7	85.5	87.2	87.2	87.1	85.2	87.2	88.4	84.0	87.3
(R+M)/2	91.0	90.9	90.8	91.4	91.6	91.5	87.8	91.1	93.2	88.4	90.9
Oleylamine, #/MB	5	5	2	6	16	6	5	<1	12	14	4
Benzene, wt %	2.0	1.7	1.7	1.7	1.8	1.8	5.4	2.8	3.4	1.7	1.4
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	LAR/SFR	Chevron	LAR	LAR/SFR

7 PTB oleylamine ~ 3mg. vs. 20mg [illegible] ⇒ 88% red

UNION 76 UNLEADED

GASOLINES

SEPTEMBER 3, 1985

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	60.4	60.1	60.3	53.1	53.4	53.4	63.0.	50.9	68.8	56.0	53.8
D86 Dist. - IBP	84	89	90	90	81	83	82	85	86	88	82
5%	111	101	102	108	98	116	90	97	98	112	90
10%	124	119	121	119	110	132	103	124	109	125	108
20%	141	140	144	142	131.	152	116	151	122	149	159
30%	162	162	165	166	152	168	128	178	136	174	174
50%	197	199	203	216	201	219	161	229	180	226	233
70%	244	244	249	276	261	277	214	279	235	277	273
90%	331	319	333	329	319	336	268	334	273	351	300
95%	370	385	393	361	351	357	298	365	293	380	355
End Point	435	434	450	418	405	406	344	414	334	438	394
W.U.N.	369	364	374	385	362	396	301	402	325	405	387
F.I.A. % A	22.0	23.5	24.0	41.0	40.0	40.5	29.0	42.5	45.5	30.0	41.5
% O	9.0	7.0	7.0	0.0	0.0	0.0	0.0	7.0	0.5	7.0	1.0
% S	69.0	69.5	69.0	59.0	60.0	59.5	71.0	50.5	59.0	63.0	57.5
Vapor Pressure	8.8	8.8	8.6	9.2	9.0	6.6	9.9	7.6	10.6	8.6	11.6
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	259	247	246	<5	<5	<5	<5	131	<5	229	37
T V/L Ratio @ 20:1, 'F	138	139	139	141	140	141	116	149	124	145	130
Research Octane	93.9	93.5	93.6	94.4	94.5	94.6	91.1	95.0	94.0	92.6	94.7
Motor Octane	84.5	84.4	84.5	85.0	85.1	85.2	84.3	83.8	84.9	83.0	85.2
(R+M)/2	89.2	89.0	89.0	89.7	89.8	89.9	87.7	89.4	89.4	87.8	90.0
Oleylamine, #/MB	5	5	5	7	7	7	13	<1	14	10	<1
Benzene, wt %	1.8	1.4	1.4	1.9	1.9	1.8	5.3	2.6	3.5	1.4	2.4
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	LAR/SFR	Chevron	LAR	LAR/SFR

UNOCAL 76 SUPER LEADED, SUPER UNLEADED*, and REGULAR LEADED*

GASOLINES

JUNE 2, 1986

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage regular*	Bakers-field	Honolulu	Phoenix regular*	Portland
API Gravity @ 60'F	53.6	53.8	52.9	57.7	56.8	58.6	60.1	55.5	60.4	57.9	56.0
D86 Dist. - IBP	92	90	91	90	91	94	84	95	88	93	88
5%	106	104	104	104	104	106	87	111	92	114	102
10%	126	122	122	118	115	121	104	126	109	130	124
20%	147	143	144	133	131	135	125	142	123	149	143
30%	159	165	170	150	144	150	146	162	136	168	183
50%	217	216	221	191	183	189	187	208	176	207	232
70%	272	269	275	250	239	238	227	264	228	258	269
90%	333	333	342	324	309	315	286	331	271	343	343
95%	359	364	385	356	330	342	303	362	292	379	377
End Point	419	418	478*	417	393	404	349	418	346	433	428
W.U.N.	390	387	396	358	343	354	334	381	320	386	408
F.I.A. % A	38.5	38.5	39.0	33.0	32.5	33.5	36.5	38.0	31.5	27.5	30.5
% O	2.5	3.5	3.5	0.0	0.0	0.0	0.0	1.5	7.5	2.5	7.0
% S	59.0	58.0	57.5	67.0	67.5	66.5	63.5	60.5	61.0	70.0	62.5
Vapor Pressure	8.4	7.8	8.2	8.4	8.9	8.4	13.0	7.4	10.1	8.2	9.1
Lead, g/gal	0.44	0.42	0.44	1.04	1.06	1.02	0.21	0.75	0.45	0.32	<0.001
Lead Alkyl	TEL	TEL	TEL	RM25	RM25	RM25	RM25	85% RM25 15% TEL	TEL	TEL	
MMT, gm/gal	0.02	0.03	<0.005				0.06	0.01		<0.005	
Sulfur, ppm	82	94	123	13	9	17	5	45	42	80	203
T V/L Ratio @ 20:1, 'F	145	145	147	139	136	137	116	142	124	144	144
Research Octane	95.8	95.2	95.6*	94.5	94.4	94.6	91.5	94.7	96.0	91.5	96.3
Motor Octane	86.4	86.2	85.8*	88.2	88.1	88.1	84.4	87.1	87.1	84.6	86.0
(R+M)/2	91.1	90.7	90.7*	91.4	91.2	91.4	88.0	90.9	91.6	88.0	91.2
Oleylamine, /MB	6	6	5	6	5	5	12	4	13	9	1
Benzene, wt %	2.0	1.9	1.9	1.3	0.1	5.0	5.1	2.2	4.4	1.8	0.8
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	Kern	H.I.R.I.	LAR	LAR/SFR

Underlined numbers = off spec.
* = duplicate runs.

UNOCAL 76 UNLEADED REGULAR

GASOLINES

JUNE 2, 1986

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	59.8	59.4	57.2	52.3	53.4	53.9	60.1	51.2	56.3	56.5	60.4
D86 Dist. - IBP	90	90	90	90	88	90	88	93	87	94	88
5%	106	110	111	106	104	105	90	109	100	109	94
10%	123	126	129	125	125	125	101	124	111	125	105
20%	145	148	154	149	149	147	120	144	126	141	117
30%	167	171	177	174	173	170	139	165	141	165	130
50%	193	209	217	223	222	217	180	221	194	212	172
70%	242	247	261	271	275	269	223	226	238	254	231
90%	313	320	331	326	333	330	276	327	274	342	283
95%	354	367	371	353	373	359	296	371	291	378	312
End Point	414	433	434	424	424	421	345	415	323	430	362
W.U.N.	358	378	391	393	395	389	322	391	340	388	318
F.I.A. % A	26.0	25.5	31.5	44.0	41.5	41.0	37.0	46.5	41.0	33.0	32.5
% O	9.0	9.5	10.5	0.0	4.0	4.5	0.0	0.0	0.5	6.0	4.0
% S	65.0	65.0	58.0	56.0	54.5	54.5	63.0	53.5	58.5	61.0	63.5
Vapor Pressure	8.4	8.6	8.4	8.8	8.7	8.4	13.0	8.4	6.7	8.4	11.3
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001
Sulfur, ppm	252	249	269	23	89	102	12	104	<5	138	32
T V/L Ratio @ 20:1, 'F	143	143	144	142	144	142	116	144	126	142	122
Research Octane	93.5	93.2	93.6	93.7	94.4	94.7	90.8	93.4	93.4	91.0	91.7
Motor Octane	84.5	84.6	84.5	85.1	85.1	84.8	83.6	84.0*	85.2	82.5	84.2
(R+M)/2	89.0	88.9	89.1	89.4	89.8	89.8	87.2	88.7*	89.3	86.8	88.0
Oleylamine, /MB	6	6	6	5	5	5	11	0	17	16	15
Benzene, wt %	2.1	1.9	1.7	1.8	1.7	1.9	5.0	4.4	6.7	2.1	4.5
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	Kern	H.I.R.I.	LAR	LAR/SFR

Underlined numbers = off spec.
* = duplicate runs.

UNOCAL SUPER 76 UNLEADED, SUPER LEADED*, and REGULAR LEADED*

GASOLINES

September 2, 1986

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage regular*	Bakers-field	Honolulu*	Phoenix	Portland
API Gravity @ 60'F	50.1	51.1	51.8	55.5	55.4	53.8	61.4	53.9	57.1	52.9	55.3
D86 Dist. - IBP	90	90	88	86	86	86	80	84	90	83	82
(% evap) 5%	109	104	104	116	113	107	96	109	114	105	102
10%	126	124	120	132	126	129	109	128	124	124	119
20%	158	155	152	160	149	155	125	158	139	158	154
30%	189	187	186	186	170	181	142	187	156	189	190
50%	240	239	249	226	225	229	178	236	200	234	235
70%	280	278	272	261	283	270	220	273	244	272	277
90%	329	328	332	328	334	332	278	329	288	331	343
95%	360	358	367	358	358	366	302	359	311	364	375
End Point	418	408	414	420	408	417	352	411	382	420	411
W.U.N.	412	410	419	413	399	403	324	409	357	406	409
F.I.A. % A	47.5	44.0	43.0	33.0	46.0	37.0	29.0	38.0	36.0	40.0	34.0
% O	8.0	7.0	7.5	8.0	0.0	5.0	0.0	8.0	0.0	4.0	5.0
% S	44.5	49.0	49.5	59.0	54.0	58.0	31.0	54.0	64.0	56.0	61.0
Vapor Pressure, psi	8.4	8.0	8.0	8.4	8.8	8.4	11.7	8.6	9.4	7.8	10.0
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.34	<0.01	0.51	<0.01	<0.01
MTBE, vol %	0.3	0.1	0.1	<0.1	9.0	2.6	-	0.1	<0.1	0.1	0.1
Sulfur, ppm	205	184	189	100	<5	68	9	178	<5	140	153
T V/L Ratio @ 20:1, 'F	146	146	146	146	143	146	118	146	133	149	137
Research Octane	98.3	97.4	97.2	97.4	97.5	97.3	90.9	97.7	96.0	97.0	96.0
Motor Octane	85.9	86.1	85.9	86.3	86.6	86.7	84.2	86.3	87.5	86.4	85.6
(R+M)/2	92.1	91.8	91.6	91.8	92.0	92.0	87.6	92.0	91.8	91.7	90.8
Oleylamine, #/MB	7	5	5	0	6	1	11	4	15	0	15
Benzene, wt %	1.8	1.7	1.5	1.6	0.8	1.3	4.3	1.3	4.1	1.8	0.8
Source	LAR	LAR	LAR		SFR		Tesoro	Kern	H.I.R.I.		

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UNOCAL 76 UNLEADED REGULAR

GASOLINES

September 2, 198

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Anchorage	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	57.0	56.0	55.7	-	54.4	54.2	58.4	57.0	56.7	57.1	56.0
D86 Dist. - IBP	89	92	88	-	91	88	82	90	83	86	83
(% evap) 5%	108	108	105	-	114	104	88	109	102	106	96
10%	122	126	119	-	127	122	106	126	111	121	115 -
20%	144	138	143	-	149	144	127	148	128	140	139
30%	164	147	166	-	174	170	148	174	146	161	163
50%	209	215	210	-	221	216	190	216	204	202	210 -
70%	252	265	255	-	276	269	232	257	252	259	264
90%	318	336	318	-	343	334	288	326	296	339	327 -
95%	347	363	348	-	385	362	314	355	318	370	361
End Point	392	410	394	-	406	421	367	417	361	422	385
W.U.N.	375	389	375	-	398	388	338	387	358	375	376
F.I.A. % A	34.0	33.0	35.0	-	38.0	36.0	33.0	29.0	40.5	29.0	34.0
% O	9.0	9.0	8.0	-	0.0	0.0	0.0	7.0	0.0	7.0	0.0
% S	57.0	58.0	57.0	-	62.0	64.0	67.0	64.0	59.5	64.0	66.0
Vapor Pressure, psi	7.8	8.0	7.4	-	7.4	8.3	12.2	8.4	10.4	8.5	10.3
Lead, g/gal	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE, vol %	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfur, ppm	260	229	240	-	58	105	<5	211	<5	242	33
T V/L Ratio @ 20:1, 'F	142	143	142	-	145	144	120	142	126	141	132
Research Octane	95.3	94.8	95.3	-	94.4	94.4	91.2	95.2	93.8	91.7	91.2
Motor Octane	84.3	84.1	84.2	-	84.4	84.4	82.8	84.5	85.1	82.3	82.5
(R+M)/2	89.8	89.4	89.8	-	89.4	89.4	87.0	89.8	89.4	87.0	86.8
Oleylamine, #/MB	7	7	7	-	6	6	11	5	11	4	6
Benzene, wt %	1.6	1.4	1.7	-	1.2	1.1	4.3	1.2	4.7	1.6	1.3
Source	LAR	LAR	LAR	SFR	SFR	SFR	Tesoro	Kern	H.I.R.I.	LAR	

UNOCAL 76 UNLEADED REGULAR

GASOLINES

March 2, 1987

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	57.0	57.5	57.5	55.3	55.6	55.3	54.8	57.7	56.8	63.2
D86 Dist. - IBP	91	88	90	84	80	82	80	92	90	82
(% evap) 5%	111	102	105	91	85	87	85	100	109	89
10%	124	119	118	116	110	110	107	114	123	111
20%	147	142	141	141	136	138	132	126	144	121
30%	169	169	164	168	165	169	158	139	165	139
50%	217	210	209	220	207	221	219	190	219	179
70%	269	258	255	278	278	279	280	248	274	229
90%	340	320	324	333	332	340	332	279	341	298
95%	369	349	354	361	360	369	358	353	369	330
End Point	428	402	398	410	410	416	410	380	424	378
W.U.N.	392	376	376	389	373	390	383	339	394	333
F.I.A. % A	32.5	33.5	33.5	36.5	37.5	37.0	41.0	38.0	31.5	26.5
% O	4.0	5.0	5.5	0.0	0.0	0.0	0.0	2.0	3.5	0.0
% S	63.5	61.5	61.0	63.5	62.5	63.0	59.0	60.0	65.5	73.5
Vapor Pressure, psi	9.0	7.9	10.0	11.6	11.4	11.4	11.4	10.2	8.0	12.2
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE, vol %	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfur, ppm	139	178	177	8	<5	8	10	20	183	<5
T V/L Ratio @ 20:1, 'F	135	130	130	122	122	122	124	124	140	112
Research Octane	93.7	94.7	94.7	93.8	93.8	93.6	94.5	93.9	91.2	90.4
Motor Octane	84.1	84.5	84.5	84.3	84.5	84.4	85.3	84.5	82.4	83.5
(R+M)/2	88.9	89.6	89.6	89.0	89.2	89.0	89.9	89.2	86.8	87.0
Oleylamine, #/MB	17	17	18	30	14	14	24	16	13	24
Benzene, wt %	2.0	1.6	1.6	1.4	1.4	1.3	2.5	4.9	1.6	3.6
Source	LAR	LAR	LAR	SFR	SFR	SFR	Kern	H.I.R.I.	LAR	Exchange

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UNOCAL 76 SUPER UNLEADED

GASOLINES

June 1, 1987

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	54.1	50.5	51.3	57.0	50.7	56.6	48.0	53.8	53.3	57.1
D86 Dist. - IBP	95	74	94	94	90	94	94	81	96	92
(% evap) 5%	113	87	110	112	109	113	116	95	105	109
10%	128	115	129	131	126	133	129	114	136	129
20%	150	157	157	157	151	157	159	139	157	159
30%	172	187	187	182	177	181	180	170	183	189
50%	219	238	240	235	240	224	243	211	226	229
70%	258	277	279	259	287	258	315	249	263	260
90%	318	329	336	320	339	321	351	302	326	332
95%	344	356	365	349	366	351	375	328	355	364
End Point	398	413	428	420	432	417	444	375	426	404
W.U.N.	388	405	416	406	415	396	424	368	401	403
F.I.A. % A	39.5	48.5	46.0	31.5	46.5	32.5	53.0	43.5	40.5	30.5
% O	8.5	6.5	7.5	6.5	0.0	5.5	0.0	6.0	7.5	3.5
% S	52.0	45.0	46.5	62.0	53.5	62.0	47.0	50.5	52.0	66.0
Vapor Pressure, psi	8.4	8.0	8.0	8.6	8.0	8.4	7.6	10.5	8.4	8.4
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE, vol %	1.5	0.1	0.1	0.1	3.6	<0.1	<0.1	2.4	0.1	<0.1
Sulfur, ppm	208	170	186	106	<5	105	<5	124	210	122
T V/L Ratio @ 20:1, 'F	141	146	145	146	147	146	151	130	148	144
Research Octane	97.7	97.8	97.7	97.1	97.4	97.0	97.7	97.8	97.6	95.9
Motor Octane	86.2	86.3	85.9	86.7	86.6	86.6	86.8	86.4	86.2	86.2
(R+M)/2	92.0	92.0	91.8	91.9	92.0	91.8	92.2	92.1	91.1	91.0
Oleylamine, #/MB	16	15	14	20	18	20	30	13	36	19
Benzene, wt %	2.3	2.7	2.3	2.0	0.7	2.1	3.3	5.2	2.6	1.6
Source	LAR	LAR	LAR	SFR/EXXON	SFR/EXXON	SFR/EXXON	Texaco	H.I.R.I.	LAR	Exchange

UNOCAL 76 UNLEADED REGULAR

GASOLINES

June 1, 1987
(* CORRECTED DATA JULY 21, 1987)

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F	56.3	56.2	56.3	53.9	53.9	53.8	51.2	57.6	56.6	59.0
D86 Dist. - IBP	92	86	90	90	94	91	94	88	91	83
(% evap) 5%	110	105	108	108	113	106	111	103	110	95
10%	124	124	125	124	128	123	129	111	125	111
20%	144	153	145	147	148	145	152	122	146	132
30%	163	177	165	169	170	168	177	137	168	154
50%	208	229	210	223	220	220	229	186	217	196
70%	267	290	268	279	273	277	280	241	273	248
90%	342	364	344	338	331	334	334	279	353	321
95%	390	396	378	362	358	360	359	298	389	349
End Point	448	460	436	431	416	426	424	347	460	404
W.U.N.	384	412	387	397	393	392	404	334	397	358
F.I.A. % A	33.5	31.0	33.0	41.5	38.5	39.0	44.5	40.5	30.0	40.5
% O	2.5	8.0	3.5	0.5	0.5	0.0	0.0	0.5	8.5	0.5
% S	64.0	61.0	63.5	58.0	61.0	61.0	55.0	59.0	61.5	59.0
Vapor Pressure, psi	8.2	8.2	7.7	8.0	8.6	8.0	8.0	10.1	7.9	10.4
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE, vol %	4.3	0.4	4.6	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Sulfur, ppm	*58	*216	*105	*13	*9	*14	<5	<5	216	51
T V/L Ratio @ 20:1, 'F	*139	*144	*141	*143	*142	*144	149	125	143	127
Research Octane	93.2	93.6	93.7	94.1	94.0	94.0	94.3	93.8	91.5	90.9
Motor Octane	83.9	83.7	84.0	84.5	84.5	84.7	84.2	84.9	82.0	83.2
(R+M)/2	88.6	88.6	88.8	89.3	89.2	89.4	89.2	89.4	86.8	87.0
Oleylamine, #/MB	16	15	14	31	16	15	28	14	33	15
Benzene, wt %	1.8	0.8	1.5	1.3	1.5	1.2	2.6	7.0	1.7	2.2
Source	LAR	LAR	LAR	SFR	SFR	SFR	Texaco	H.I.R.I.	LAR	LAR/SFR

UNOCAL 76 SUPER UNLEADED

GASOLINES

September 1, 1987

AREA		Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix	Portland
API Gravity @ 60'F		51.1	49.8	50.7	57.1	50.7	57.2	48.4	51.5	50.9	57.2 51.5
D86 Dist. - IBP		102	96	95	96	90	90	88	86	102	90
(% evap)	5%	111	108	115	115	116	110	106	100	116	107
	10%	128	129	137	135	130	125	116	114	133	122
	20%	156	156	155	161	156	152	139	136	163	154
	30%	184	185	181	188	180	184	168	160	189	185
	50%	230	235	234	224	241	220	223	211	239	228
	70%	275	280	279	255	288	255	276	247	283	264
	90%	322	325	330	320	338	333	336	279	337	338
	95%	340	352	357	349	368	360	357	303	364	377
	End Point	400	400	402	440	418	426	410	338	432	412
W.U.N.		400	407	411	397	418	393	393	360	417	401
F.I.A.	% A	48.0	49.0	48.0	30.5	45.5	30.5	49.0	48.5	46.0	28.5
	% O	5.5	1.5	0.5	6.5	0.0	4.5	0.0	3.5	3.0	5.5
	% S	46.5	49.5	51.5	63.0	54.5	65.0	51.0	48.0	51.0	66.0
Vapor Pressure, psi		9.0	8.1	8.5	8.4	7.8	7.7	7.1	9.6	8.4	9.3
Lead, g/gal		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE, vol %		2.8	2.7	2.7	<0.1	6.4	<0.1	<0.1	7.1	0.1	<0.1
Sulfur, ppm		116	44	149	79	<5	85	<5	17	138	152
T V/L Ratio @ 20:1, 'F		144	149	146	147	150	148	152	139	149	140
Research Octane		97.7	97.2	97.6	96.9	97.3	96.7	97.3	98.0	97.0	95.8
Motor Octane		85.6	86.3	85.9	86.4	86.6	86.4	86.7	86.5	86.1	85.9
(R+M)/2		91.7	91.8	91.8	91.7	92.0	91.6	92.0	92.3	91.6	90.9
Oleylamine, #/MB		21	19	20	23	17	22	22	17	22	30
Benzene, wt %		2.3	2.6	2.3	1.9	0.7	1.8	2.6	3.7	2.1	1.5
vol %		2.0	1.3	2.0							
Source		LAR	LAR	LAR	Exxon	SFR	Exxon	Kern	H.I.R.I.	LAR	LAR/SFR/Tosco
Sample Date		9/1	9/1	9/1	9/1	9/1	9/1	8/31	8/27	9/14	8/31

UNOCAL 76 SUPER UNLEADED

GASOLINES

June 1, 1988

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix	Portland	
API Gravity @ 60'F	51.0	51.1	51.1	52.3	53.1	54.5	48.4	52.5	52.3	58.3	51.4 ave
D86 Dist. - IBP	92	88	90	88	88	88	91	78	82	79	
(% evap) 5%	110	109	103	106	108	112	112	98	106	88	
10%	123	125	120	123	117	128	129	111	128	104	
20%	142	153	151	149	134	158	155	124	163	122	
30%	180	182	179	175	161	185	183	140	189	148	
50%	230	230	231	226	215	229	238	208	228	199	
70%	274	273	278	267	269	269	289	274	266	255	
90%	327	325	336	322	327	338	346	324	326	322	
95%	354	350	358	346	348	365	373	350	352	354	
End Point	402	395	420	401	400	418	430	403	422	392	
W.U.N.	400	400	403	394	382	405	417	371	400	359	
F.I.A. % A	48.0	51.0	51.5	47.5	46.0	37.2	55.0	27.0	53.5	35.5	
% O	7.0	5.5	6.5	10.0	0.5	8.2	1.0	8.5	3.0	2.5	
% S	45.0	43.5	42.0	42.5	53.5	54.6	44.0	64.5	43.5	62.0	
Vapor Pressure, psi	8.9	8.7	8.7	8.8	8.6	8.5	7.3	10.8	8.2	11.8	
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
MTBE, vol %	3.5	2.4	2.2	<0.1	7.3	<0.1	<0.1	0.3	0.1	4.7	
Sulfur, ppm	183	153	160	38	5	85	<5	236	75	64	
T V/L Ratio @ 20:1, 'F	146	148	147	144	142	149	150	130	152	121	
Research Octane	98.5	98.0	98.2	98.0	97.5	97.5	98.1	98.4	97.4	97.4	
Motor Octane	86.4	86.5	86.6	86.2	87.0	86.5	87.0	86.9	87.0	87.2	
(R+M)/2	92.5	92.3	92.4	92.1	92.3	92.0	92.6	92.7	92.2	92.2	
Oleylamine, #/MB	17	15	15	27	18	23	23	8	36	19	
Benzene, wt %	1.8 1.6	2.4 2.1	2.3 2	3.1	0.8	2.3	2.8	2.0	3.1	0.9	
Toluene, wt %	12.9	13.0	13.0	14.6	10.7	10.7	14.1	13.9	13.9	8.3	
Xylene, wt %	18.1	18.0 16.3	18.3	18.5	16.3	14.7	16.3	19.6	16.4	13.0	
Source	LAR	LAR	LAR	Exxon	SFR	Exxon	Texaco	H.I.R.I.	LAR	LAR/SFR/Tosco	
Sample Date	6/6	6/6	6/6	6/5	6/3	6/5	6/6	6/15	6/6	6/3	

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UNOCAL 76 REGULAR

GASOLINES

June 1, 1988

AREA	Los Angeles	Villa Park	Yorba Linda	Bur-lingame	Richmond	San Jose	Bakers-field	Honolulu	Phoenix reg 87	Phoenix reg 88	Portland reg 87	Portland reg 89
API Gravity @ 60'F	58.9	56.2	56.2	54.9	54.6	54.9	51.4	67.9	55.8	55.2	58.2	58.1
D86 Dist. - IBP	88	94	82	94	90	[illegible]	92	85	96	90	82	78
(% evap) 5%	106	105	110	108	108	107	114	104	118	113	94	92
10%	119	118	125	118	119	119	129	115	124	129	108	103
20%	139	136	143	136	139	140	150	130	142	149	130	123
30%	157	156	161	156	159	160	177	144	162	171	147	145
50%	198	192	205	207	207	208	230	179	212	223	199	192
70%	247	249	251	269	264	272	288	215	284	276	254	252
90%	333	326	316	333	349	338	343	266	350	348	324	318
95%	359	351	348	354	370	365	373	300	372	377	353	342
End Point	420	416	415	430	418	422	428	374	430	430	408	388
W.U.N.	368	359	372	377	383	380	408	324	390	403	361	350
F.I.A. % A	33.5	36.8	36.1	37.1	38.2	38.4	45.7	15.5	36.7	33.2	34.8	34.5
% O	7.5	7.1	7.9	0.4	0.4	0.5	0.5	17.5	5.2	9.7	5.8	4.3
% S	59.0	56.1	56.0	62.5	61.4	61.1	53.8	67.0	58.1	57.1	59.4	61.2
Vapor Pressure, psi	8.7	8.4	8.3	8.3	8.7	8.5	8.2	8.9	8.5	7.9	10.7	11.5
Lead, g/gal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01
MTBE, vol %	2.1	2.0	1.8	3.3	2.4	3.3	0.1	<0.1	<0.1	<0.1	<0.1	1.0
Sulfur, ppm	180	213	215	9	<5	8	<5	211	183	403	98	82
T V/L Ratio @ 20:1, 'F	140	142	143	140	141	142	148	128	142	137	128	123
Research Octane	94.0	94.5	94.5	93.4	93.7	93.6	94.5	92.9	91.8	94.1	92.1	94.1
Motor Octane	84.3	84.1	84.1	84.7	84.7	84.5	84.5	84.2	82.3	83.1	82.8	84.5
(R+M)/2	89.2	89.3	89.3	89.1	89.2	89.1	89.5	88.6	87.1	88.6	87.5	89.3
Oleylamine, #/MB	15	15	15	19	19	18	22	8	41	22	23	21
Benzene, wt %	2.3	2.3	2.3	1.4	1.4	1.4	2.0	0.4	1.2	1.3	3.6	2.5
Toluene, wt %	8.4	10.0	9.9	9.4	9.8	9.4	11.5	7.6	5.7	7.2	11.2	9.9
Xylene, wt %	11.5	13.7	13.6	13.9	14.4	14.0	15.5	4.4	9.5	10.4	13.2	13.1
Source	LAR	LAR	LAR	SFR	SFR	SFR	Texaco	Chevron	LAR/Texaco	exchange	LAR/SFR/Arco	
Sample Date	6/6	6/6	6/6	6/5	6/3	6/5	6/6	6/15	6/6	6/6	6/3	6/3

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TUCSON AREA

UNLEADED REGULAR GASOLINE

SEPTEMBER 1976

BRAND	ARCO	EXXON	MOBIL	SHELL	STANDARD	TEXACO	UNION
API GRAVITY	60.3	60.4	59.9	62.1	59.2	60.9	59.4
IBP - D86 DIST.	94	92	88	97	90	104	92
5%	104	108	105	115	106	126	112
10%	119	126	124	130	125	139	130
20%	147	155	151	155	151	159	158
30%	175	182	175	176	180	180	184
50%	220	227	219	211	226	218	241
70%	261	273	264	234	274	253	280
90%	337	356	346	286	352	315	364
95%	363	398	382	343	392	349	408
END POINT	410	440	424	404	434	406	434
W.U.N.	380	393	380	355	390	375	410
VAPOR PRESSURE	8.9	8.9	8.9	8.4	8.9	7.5	8.9
LEAD, g/gal.	0.002	0.000	0.011	0.012	0.012	0.006	0.013
SULPHUR, ppm	233	481	579	88	549	202	576
PHOSPHORUS, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MANGANESE, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.135

BAKERSFIELD AREA

PREMIUM GASOLINE

SEPTEMBER 1976

BRAND	ARCO	MOBIL	PHILLIPS	SHELL	STANDARD	TEXACO	UNION
API GRAVITY	58.9	54.8	53.7	54.5	51.3	55.5	56.8
IBP - D86 DIST.	91	90	96	96	106	100	95
5%	113	107	115	114	124	114	111
10%	130	123	134	127	137	128	124
20%	154	151	156	154	167	148	145
30%	177	181	179	184	192	175	171
50%	227	236	222	241	234	229	224
70%	274	287	260	293	280	285	280
90%	340	354	316	357	332	352	354
95%	368	380	368	304	354	376	383
END POINT	409	418	410	430	408	430	424
W.U.N.	387	400	376	409	398	397	391
VAPOR PRESSURE	8.3	8.6	7.4	8.5	8.4	8.9	8.7
LEAD, g/gal.	3.72	3.05	3.34	3.31	2.60	3.31	3.47
SULPHUR, ppm	15	122	124	66	24	82	116
PHOSPHORUS, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.000

BAKERSFIELD SEPTEMBER 1981

UNLEADED GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
API Gravity @ 60°F	49.9	52.4	54.9	55.5	53.2	56.1
D86 Dist. - IBP	92	94	88	88	92	98
5%	110	116	109	107	108	119
10%	131	135	126	120	123	140
20%	162	159	146	142	153	143
30%	188	183	164	166	182	187
50%	243	226	215	215	233	224
70%	290	275	273	276	281	263
90%	336	334	327	351	338	335
95%	374	363	369	377	369	365
End Point	405	405	408	406	404	415
W.U.N.	420	404	386	392	407	404
F.I.A. % A	47.0	42.0	39.5	34.5	42.5	34.0
% O	0.5	0.5	5.5	9.5	3.5	2.5
% S	52.5	57.5	55.0	56.0	54.0	63.5
Vapor Pressure, psi	8.4	8.3	8.0	7.9	8.9	7.5
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	24	8	305	324	395	141
T V/L Ratio @ 20:1, °F	155.0	146.3	144.2	146.9	141.5	151.4
Research Octane	92.5	92.4	92.7	92.6	92.2	95.9
Motor Octane	82.8	83.1	83.0	82.9	82.7	86.4
Oleylamine, #/MB	----------	----------	----------	----------	----------	7.5

BAKERSFIELD

SEPTEMBER 1981

PREMIUM GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
Type	Unleaded	Unleaded	Unleaded	Unleaded	Unleaded	Leaded
API Gravity @ 60°F	47.8	55.2	55.3	55.2	50.5	56.5
D86 Dist. - IBP	86	92	92	91	87	92
5%	106	110	120	115	114	114
10%	123	132	139	133	134	127
20%	153	172	165	160	164	146
30%	182	192	190	186	192	165
50%	242	229	225	223	238	214
70%	292	265	264	268	285	272
90%	351	318	335	334	340	336
95%	381	353	363	369	389	362
End Point	438	413	422	404	424	413
W.U.N.	420	400	405	400	417	389
F.I.A. % A	54.5	36.0	36.0	37.0	47.5	33.5
% O	0.5	9.0	2.5	4.5	3.0	9.5
% S	45.0	55.0	61.5	58.5	49.5	57.0
Vapor Pressure, psi	7.9	7.0	7.6	8.4	8.0	7.9
Lead, g/gal	<0.001	0.13	<0.001	<0.001	<0.001	2.18
Sulfur, ppm	15	71	114	189	25.	1060
T V/L Ratio @ 20:1, °F	150.5	149.0	152.8	149.7	149.7	143.2
Research Octane	97.0	96.4	96.3	96.7	96.7	96.6
Motor Octane	86.0	85.7	86.3	86.2	85.6	86.7
Oleylamine, #/MB	----------	----------	----------	----------	----------	14.9

SUPER 76 GASOLINE

TANK NUMBER	SPEC SHEET	B-100526	B-100528	B-100532	B-100534	B-100528	B-100514	B-100532	B-100514	B-100512
SAMPLE NUMBER	G-2	2165	2243	2271	2294	2306	2330	2358	2422	2458
DATE BLEND COMPLETED	DATED	02-26-73	02-28-73	03-01-73	03-04-73	03-05-73	03-06-73	03-08-73	03-10-73	03-11-73
BARRELS BLENDED	02/06/73	39.5	29.6	34.6	69.1	44.5	39.5	59.3	39.6	39.5
GRADE		ML	ML	H	H	ML	ML	H	ML	ML
U60 UNIFINED C5/C6								9.96	5.90	
UNISOL LT CAT GASO		6.80	7.45	14.78	14.92	4.14	9.14	9.67	7.40	8.94
U60 REFORMATE		28.58	39.24	35.26	56.59	21.39	62.00	54.53	48.93	61.26
U91 ICS		16.55	0.38	13.98	4.99	4.45	12.65	5.15	6.45	
MLB ALKY GASO			4.29					6.90	8.54	
BLENDING BUTANE			2.79			4.30		2.79	3.97	2.85
U120 LT UNICRACKATE		20.96	31.33	13.47	18.65	23.40	13.68	6.81	10.87	25.85
U60 REFORMATE		23.26	10.61	18.28	3.43	19.32			6.19	
U80 UNIF HVY CAT GASO		3.87	3.87	3.60	1.39	0.99	2.51	4.14	1.70	1.08
U-110 MOTOR ALKY						21.96				
GRAVITY API 60F		55.8	55.5	55.9	54.2	59.6	54.5	55.7	56.1	54.4
CORROSION 3 HOURS 122F	1 MAX			1A						
VAPOR PRESS REID 100F PSI	SPEC/RESULT	90MX88	126MX76	90MX86	90MX68	90MX89	90MX81	90MX84	90MX89	90MX76
V/L RATIO	22 MAX	122T15	122T0	130T5	130T0	122T1	122T1	130T2	122T1	122T0
30 DAY AVERAGE	20 MAX	17	16	8	6	14	14	4	13	12
GUMS SOLV WASHED MG/100 ML	4.0 MAX			0.2						
GUMS ISO MG/LITER				1.1						
ISO RATING	100 MAX			16						
OXIDATION STAB MINUTES	240 MIN			780						
DIAZO NUMBER	45 MAX			21						
NAPHTHALENES FIA VOL PCT				0.55						
AROMATICS FIA VOLUME PCT		36.3	35.6	39.2	42.1	26.0	43.5	40.8	36.0	39.8
BROMINE NUMBER G/100G	28 MAX	8	7	15	15	5	10	11	8	9
SULFUR WEIGHT PCT	0.15 MAX			0.02				0.01-		
MERCAPTAN SULFUR PPM	4.0 MAX	1.4	1.4	1.5	1.6	1.4	1.01	0.6	0.8	0.7
LEAD CONT TOTAL G/GAL CALC	4.00 MAX	2.46	2.61	2.06	2.19	2.37	1.47	2.28	1.77	1.90
LEAD CONT TML G/GAL CALC		1.98	2.04	2.29	1.79	1.80	1.14	1.83	1.44	1.51
KR MOTOR INT COMP RESULT		91.44	91.36	91.34	90.86	92.03	90.37	91.18	91.22	90.79
KR RESEARCH INT COMP RES	99.2 MIN 1*	99.01	99.01	99.59	99.51	99.00	99.00	99.50	99.09	99.00
30 DAY AVERAGE	99.5 MIN 2*	99.10	99.09	99.50	99.51	99.03	99.02	99.52	98.99	98.99
ROAD RATING CALC	99.0 MIN	99.92	99.91	99.54	99.66	99.34	99.50	100.10	99.66	99.80
30 DAY AVERAGE	99.3 MIN	99.66	99.69	99.72	99.70	99.62	99.61	99.74	99.56	99.57
MAX DEGREES F	432 MAX	416	419	418	387	394	402	426	395	370
RECOVERY PCT	95 MIN 3*	96.5	97.5	97.0	98.0	97.5	97.5	97.5	96.5	96.5
RESIDUE PCT	2.0 MAX	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX	408	409	411	404	406	400	409	403	401
10PCT EVAPORATED DEG F	SPEC/RESULT	147MX113	147MX135	147MX119	147MX144	147MX124	147MX129	147MX135	147MX128	147MX136
PCT EVAP AT 180F		39	31	38.0	30.0	33.0	34.0	32.0	32.0	30.0
PCT EVAP AT 210F		46.5	45	46.0	43.5	45.5	45.0	45.5	43.5	44.0
PCT EVAP AT 250F		57.5	65	60.0	64.5	67.0	650	62.0	64.0	66.5
PCT EVAP AT 300F	70 MIN	76	84	80	88	84	90	88	88	91
WARM UP FACTOR	SPEC/RESULT	135MN143	135MN141	135MN144	135MN138	135MN146	135MN144	135MN140	135MN140	135MN141
30 DAY AVERAGE	SPEC/AVE	140MN142	140MN142	140MN148	140MN143	140MN142	140MN142	140MN141	140MN142	140MN142

1* NO RESEARCH SPEC. FOR I GRADE.
1* SPEC. FOR ML GRADE 98.7 MIN.
2* NO RESEARCH SPEC. FOR I GRADE.
2* SPEC FOR ML GRADE 99.0 MIN
3* DOES NOT APPLY TO C GRADE.

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

ATTACHMENT K

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SUPER 76 GASOLINE

BLEND NUMBER			334	337	342	347	350	355	359	363	368
TANK NUMBER	SPEC SHEET		B 510	8532	B 524	B 530	B 510	B 532	8524	8530	8510
SAMPLE NUMBER	G-2/G-3/G-4		4014	4047	4101	4173	4200	4271	4292	4355	4408
DATE BLEND COMPLETED	DATED		09/26/82	09/29/82	10/03/82	10/07/82	10/10/82	10/15/82	10-18-82	10-21-82	10/26/82
BARRELS BLENDED	1-6-81		73.5	68.9	78.5	78.6	78.4	78.3	78.4	48.9	83.1
GRADE			M	M	M	M	M	M	M	M	M
UNIFINED C5/C6			9.82	11.11	32.70	37.88	19.78	39.15	19.77	34.87	44.71
UNISOL LT CAT GASO			4.65					7.06			
CHAMPLIN REFORMATE			16.26	12.92		12.03	15.08	8.36	26.04	16.04	
U80 REFORMATE				10.01		28.20					
ICS			4.82	7.14		0.37					
U110 LITE ALKY								0.78			
BLENDING BUTANE				2.57				0.85	2.98	3.91	5.24
U120 LT UNICRACKATE			35.46	15.48	29.39	18.47	33.99	9.13	19.96		10.36
U60 REFORMATE			5.11	13.10	14.07	3.04	18.75			19.64	39.70
U60 UNIF HVY CAT GASO							2.01		32.15		
U100 REFORMATE			23.89	27.67	23.84		10.39	34.67		25.54	
GRAVITY API 60 F.			57.5	52.2	60.1	58.8	56.8	57.9	54.9	58.6	61.2
VAPOR PRESS REID	SPEC/RESULT		88MX73	88MX86	88MX87	88MX84	88MX87	88MX85	88MX87	88MX86	118MX109
30 DAY AVERAGE	SPEC/RESULT		88MX85	88MX86	88MX86	88MX85	88MX86	88MX85	88MX86	88MX85	115MX109
V/L RATIO	22 MAX		13417	13476	133111	13418	13315	134710	13376	13476	124714
30 DAY AVERAGE	20 MAX		8	9	9	8	8	7	7	7	9
GUMS EXISTENT MG/100 ML	4.0 MAX				0.4						
ISO RATING	100 MAX				39						
OXIDATION STAB MINUTES	240 MIN				1440						
BROMINE NUMBER G/100G	28 MAX	1*	6	2	1	3	2	12	2	2	1
SULFUR WEIGHT PCT	0.10 MAX				<0.01						
MERCAPTAN SULFUR PPM	6.0 MAX		1.5	0.6	0.8	0.9	0.4	1.5	0.6	2.6	2.0
LEAD CONT TOTAL G/GAL CALC	4.00 MAX		1.09	0.69	1.47	1.74	1.35	1.50	1.15	1.01	1.83 (1.3)
OCTANE NO (R+M)/2	92.0/92.2 MIN	2*	92.03	92.27	92.03	92.24	92.01	92.22	92.01	92.22	92.03
30 DAY AVERAGE	92.0/92.2 MIN		92.03	92.21	92.03	92.24	92.02	92.23	92.02	92.24	92.02
EP DEGREES F	432 MAX		380	396	390	388	414	360	416	390	396
RECOVERY VOL PCT	95.0 MIN	3*	96.0	98.0	98.0	98.0	98.5	98.0	97.0	98.0	98.0
RESIDUE VOL PCT	2.0 MAX		1.0	1.06	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EP 30 DAY AVERAGE	430 MAX		391	390	388	390	393	385	399	385	404
10% EVAP DEGREES F	SPEC/RESULT		149MX128	149MX130	149MX127	149MX128	149MX128	149MX131	149MX129	149MX137	140MX118
50% EVAP DEGREES F	170 MIN SPEC MAX		248MX198	248MX234	248MX195	248MX195	248MX201	248MX196	248MX220	248MX227	243MX190
90% EVAP DEGREES F	SPEC/RESULT		374MX316	374MX332	374MX320	374MX317	374MX345	374MX302	374MX345	374MX329	365MX334
WARM UP NUMBER	SPEC/RESULT		425MX366	432MX409	432MX364	432MX364	432MX379	432MX361	432MX399	432MX404	412MX360
30 DAY AVERAGE	SPEC/RESULT		432MX393	425MX397	425MX377	425MX391	425MX377	425MX385	425MX380	425MX390	405MX360

1* APPLIES TO M AND ML GRADES ONLY
2* SUPER M&C ARE 92.0. SUPER M IS 92.2.
3* DOES NOT APPLY TO C GRADE

DISTRIBUTION - GEN.SUPT.OPER, SUPT. R.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

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REGULAR 76 GASOLINE

BLEND NUMBER			089	091	094	095	096	099	101	103	106
TANK NUMBER	SPEC SHEET		B538	B526	B542	B514	B536	B538	B526	B542	B 512
SAMPLE NUMBER	G-40		1163	1186	1215	1225	1237	1272	1289	1297	1323
DATE BLEND COMPLETED	DATED		03-25-81	03-27-81	03-29-81	03-30-81	03-31-81	04-02-81	04-04-81	04-05-81	04/08/81
BARRELS BLENDED	11-15-80		68.9	73.9	68.8	83.7	39.4	4438	73.9	44.8	44.2
GRADE			K	M	H	H	M	M	M	H	M
UNIFINED C5/C6			2.68						5.49	2.27	6.85
UNISOL LT CAT GASO			22.55	29.40	11.74	26.37	26.58	24.83	23.03	26.11	25.96
USS AVIA BASE STOCK					6.61						
CHAMPLIN REFORMATE					25.02	5.21	20.77		6016		8.39
U80 REFORMATE			31.81	32.01	23.04	39.60	34.59	34.63	23.31	15.86	
ICS							1.30				
U110 LITE ALKY			6.46	6.72							
BLENDING BUTANE			5.07	4.85	5.79	4.70	3.81	4.99	4.40	4.83	3.98
U60 REFORMATE			6.47	15.77		6.52	3.02	11.06	14.26	16.57	25.11
U60 UNIF HVY CAT GASO											1.14
MOTOR ALKY			22.97	11.25	27.76	17.60	9.92	24.48	21.37	34.36	28.57
GRAVITY API 60 F.			60.8	56.7	56.6	56.5	54.5	57.5	56.5	61.5	58.6
CORROSION 3 HOURS 112 F.	1 MAX							1A			
VAPOR PRESS REID	SPEC/RESULT		90MX90	90MX90	90MX88	90MX88	90MX89	90 MX 86	90 MX 88	90 MX 88	90 MX 86
30 DAY AVERAGE	SPEC/RESULT		90MX88	90MX84	90MX86	90MX85	90MX88	90 MX 88	90 MX 57	90 MX 87	90 MX 87
V/L RATIO	22 MAX		12417	12412	13318	125 T 3	125 T 2	125 T 2	125 T 2	133 T 11	125 T 2
30 DAY AVERAGE	20 MAX		4	2	6.8	2	3.6	3.2	2.7	8.5	3
GUMS EXISTENT MG/100 ML	4.0 MAX							0.6			
ISD RATING	100 MAX							68			
OXIDATION STAB MINUTES	240 MIN		630	555	1110	600.	720	600	840	690	1050
DIAZO NUMBER	45 MAX							17			
BROMINE NUMBER G/100G	28 MAX	1*	18	21	11	20	21	19	17	20	19
SULFUR PPM	400 MAX		130	141	104	140	127	116	109	132	131
MERCAPTAN SULFUR PPM	6.0 MAX		2.4	1.9	1.0	1.4	1.5	<0.1	<0.1	0.5	2.2
LEAD, GM/GAL	0.02 MAX		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD, GM/GAL (TANK)	0.02 MAX		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MOTOR OCTANE	84.5 MIN		85.00	84.53	85.15	84.52	84.73	84.75	84.53	84.84	84.52
30 DAY AVERAGE	84.5 MIN		84.93	84.53	84.69	84.52	84.89	84.86	84.53	84.77	84.53
OCTANE NO (R+M)/2	89.0 MIN		89.54	89.46	89.54	89.50	89.96	89.62	89.26	89.51	89.22
30 DAY AVERAGE	89.0 MIN		89.53	89.44	89.57	89.45	89.62	89.62	89.30	89.58	89.29
EP DEGREES F	432 MAX		387	401	400	388	401	696	410	400	422
RECOVERY VOL PCT	95.0 MIN	2*	96.5	97.0	96.0	97.5	97.0	97.5	97.5	97.0	97.0
RESIDUE VOL PCT	2.0 MAX		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EP 30 DAY AVERAGE	430 MAX		400	405	418	403	400	399	402	416	404
10% EVAP DEGREES F	SPEC/RESULT		140MX125	140MX132	149MX139	140MX122	140MX125	140MX127	140MX128	140MX129	140MX127
50% EVAP DEGREES F	170 MIN SPEC MAX		243MX217	243MX232	248MX233	243MX230	243MX229	243MX230	243MX227	243MX221	248MX222
90% EVAP DEGREES F	SPEC/RESULT		365MX323	365MX340	374MX323	365MX326	365MX327	365MX330	365MX339	365MX338	374MX356
WARM UP NUMBER	SPEC/RESULT		412MX386	412MX410	412MX409	412MX399	412MX400	412MX403	412MX403	412MX397	412MX404
30 DAY AVERAGE	SPEC/RESULT		405MX398	405MX395	405MX394	405MX395	405MX398	405MX399	405MX397	405MX396	405MX398

1* APPLIES TO H AND ML GRADES ONLY
2* DOES NOT APPLY TO C GRADE

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGRG, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

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REGULAR 76 GASOLINE

BLEND NUMBER		104	109	111	115	116	117	118	120	121
TANK NUMBER	SPEC SHEET	81701	526	8540	8538	8528	8542	8512	8536	8540
SAMPLE NUMBER	G-98	1428	1442	1476	1548	1560	1574	1600	1662	1688
DATE BLEND COMPLETED	DATED	04-05-80	04-06-80	04-08-80	04-12-80	04-13-80	04-14-80	04-14-80	04-16-80	04-17-80
BARRELS BLENDED	02-15-79	98.8	83.9	74.0	83.7	84.9	83.6	83.9	83.5	83.5
GRADE		C	M	M	M	M	M	M	M	M
UNIFINED C5/C6			18.95	11.89	12.49	12.84	27.11	10.18		7.91
UNISOL LT CAT GASO		25.91	19.65	22.57	20.88		22.43		23.13	22.54
U80 REFORMATE		45.47	12.5	43.87	20.74	19.02	9.07	1.55	18.54	46.26
BLENDING BUTANE		11.21	2.96	4.41	4.03	2.95	1.78	1.93	2.01	3.33
U120 LT UNICRACKATE		13.29	3.01		7.21	28.34		35.87	27.36	9.11
U60 REFORMATE					21.47	5.95		5.93		
U60 UNIF HVY CAT GASO		4.11	2.93	3.81		2.11		.56	4.74	3.19
MOTOR ALKY			25.53	13.55		11.53	26.39	11.69		
U100 REFORMATE			14.94		13.17	17.27	13.22	12.28	24.42	7.65
GRAVITY API 60 F.		57.0	60.4	55.5	52.8	56.4	63.1	57.7	55.3	52.8
VAPOR PRESS REID	SPEC/RESULT	138MX128	90MX85	90MX89	90MX88	90MX86	90MX80	90MX86	90MX89	90MX83
30 DAY AVERAGE	SPEC/RESULT	135MX128	90MX85	90MX87	90MX86	90MX86	90MX86	90MX86	90MX26	90MX85
V/L RATIO	22 MAX	116T18	125T1	133T6	125T1	125T1	136T12	125T1	125T3	136T7
30 DAY AVERAGE	20 MAX	18	1	6	1	1	7	1	1	7
OXIDATION STAB MINUTES	240 MIN	510	960	360	480	1440	480	1440	660	315
BROMINE NUMBER G/100G	28 MAX 1*	28	23	25	23	3	26	1	24	23
SULFUR PPM	400 MAX	307	231	242	<10	231	275	<10	258	232
MERCAPTAN SULFUR PPM	6.0 MAX	1.5	0.9	1.7	1.3	1.5	0.9	1.0	0.8	<0.1
LEAD, GM/GAL	0.02 MAX	<.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD, GM/GAL (TANK)	0.02 MAX		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MOTOR OCTANE	84.0 MIN	84.09	84.08	84.07	84.07	84.04	84.03	84.08	84.07	84.07
30 DAY AVERAGE	84.0 MIN	84.07	84.05	84.06	84.06	84.06	84.05	84.06	84.06	84.06
OCTANE NO (R+M)/2	88.0 MIN	89.35	88.87	89.18	89.56	88.20	88.62	88.15	89.36	89.44
30 DAY AVERAGE	88.0 MIN	89.16	88.93	89.03	89.02	88.94	88.97	88.88	88.92	89.04
EP DEGREES F	432 MAX	426	427	430	414	415	369	402	413	414
RECOVERY VOL PCT	95.0 MIN 2*	95.0	97.0	97.5	98.0	98.0	99.0	98.0	97.0	97.5
RESIDUE VOL PCT	2.0 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EP 30 DAY AVERAGE	430 MAX	427	407	424	413	413	416	413	413	415
10% EVAP DEGREES F	SPEC/RESULT	131MX101	140MX129	140MX133	140MX131	140MX132	140MX133	140MX135	140MX129	140MX137
50% EVAP DEGREES F	170 MIN SPEC MAX	238MX211	243MX205	243MX224	243MX239	243MX222	243MX197	243MX217	243MX215	243MX232
90% EVAP DEGREES F	SPEC/RESULT	365MX326	365MX316	365MX334	365MX340	365MX330	365MX295	365MX321	365MX325	365MX331
WARM UP NUMBER	SPEC/RESULT	371	374	401	417	397	360	390	387	409
30 DAY AVERAGE	RESULT	378	391	405	398	398	398	400	399	398

1* APPLIES TO M AND ML GRADES ONLY
2* DOES NOT APPLY TO C GRADE

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGRG, SUPT. R.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

REG 76 GASO (UNLEADED)

TANK NUMBER	SPEC SHEET	8204	378	B100514	B100542	B100512	B-204	B100540	B100542	B100512
SAMPLE NUMBER	G-B	1509	1528	1566	1609	1647	1748	1772	1823	1834
DATE BLEND COMPLETED	DATED	02-28-75	03-02-75	03-04-75	03-06-75	03-09-75	03-12-75	03-13-75	03-18-75	03-19-75
BARRELS BLENDED	03-01-74	69.2	39.8	54.6	74.5	39.8	65.0	69.7	84.4	84.0
GRADE		C	I	ML	H	ML	C	H	ML	ML
U80 UNIFINED C5/C6						5.64	11.98			
UNISOL LT CAT GASO		25.20	5.44	27.67	25.26	9.15		20.54	17.05	21.19
U33 AVIA BASE STOCK			7.48							
U80 REFORMATE		55.40	22.59	22.39	12.16	29.94		5.42	24.05	32.16
U91 IC5			14.40		3.46	16.75	12.24	4.57	9.86	7.08
BLENDING BUTANE		14.55	10.20	5.01	1.92	6.89	11.32	2.66	2.72	2.48
U120 LT UNICRACKATE			7.95	1.93	2.71			1.27		
U60 UNIF HVY CAT GASO		3.31	5.36	0.58	1.50	4.72	4.98	1.92	3.67	1.12
U-110 MOTOR ALKY		1.51						16.27		7.20
U100 REFORMATE			26.53	42.39	52.95	26.86	59.45	47.32	42.62	28.73
GRAVITY API 60F		56.6	57.9	52.9	52.2	56.0	56.2	59.8	53.7	55.4
CORROSION 3 HOURS 122F	1 MAXIMUM		1A	1A						
VAPOR PRESS REID LBS	SPEC/RESULT	147MX134	123MX122	93MX85	93MX74	129MX118	145MX131	93MX84	93MX91	93MX84
V/L RATIO	22 MAX	112T18	124T25	122T1	130T10	122T20	112T17	130T4	122T3	122T1
30 DAY AVERAGE	20 MAX	20	19	8	14	9	18	11	5	5
GUMS SOLV WASHED MG/100 ML	4.0 MAX		0.2							
GUMS ISD MG/LITER			3.3							
ISD RATING	100 MAX		59							
OXIDATION STAB MINUTES	240 MIN		1440+							
DIAZO NUMBER	45 MAX		7							
BROMINE NUMBER G/100G	28 MAX 3*			27	25	10		20	18	28
SULFUR WEIGHT PCT	0.15 MAX		0.01-							
MERCAPTAN SULFUR PPM	6.0 MAX	0.9	1.1	1.3	1.2	1.3	0.5	1.1	1.0	1.2
LEAD, GM/GAL	0.02 MAX	0.005	0.005	0.005	0.005	0.005	0.007	0.005	0.005	0.005
LEAD, GM/GAL (TANK)				0.005	0.005	0.005		0.005	0.005	0.005
ROAD RATING CALC	91.2 MIN	91.57	91.73	91.50	91.52	91.58	91.48	91.59	91.51	91.52
30 DAY AVERAGE	91.5 MIN	91.51	91.58	91.52	91.54	91.52	91.53	91.55	91.53	91.55
OCTANE NO. (R+M)/2	88.5 MIN	90.85	90.28	91.20	91.13	90.21	89.57	90.64	90.83	90.91
30 DAY AVERAGE	89 MIN	89.86	90.39	90.25	90.56	90.35	90.10	90.54	90.62	90.68
MAX DEGREES F	432 MAX 4*	422	426	376	391	432	432	379	413	381
RECOVERY PCT	95 MIN 2*	95.0	97.0	97.0	97.5	97.0	97.0	97.0	97.0	98.0
RESIDUE PCT	2.0 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX 4*	411	395	410	384	412	412	389	410	404
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX97	150MX114	150MX133	150MX136	150MX108	150MX104	150MX132	150MX123	150MX130
PCT EVAP AT 180F		36.5	35.0	32.0	31	38.5	42.0	34.0	37.5	33.5
PCT EVAP AT 210F		45.5	45.0	46.0	45	48.0	53.0	52.0	49.5	46.5
PCT EVAP AT 250F		61.0	66.0	66.5	67	65.0	73.0	78.0	67.5	67.0
PCT EVAP AT 300F	70 MIN	82	86	90	90	84	90	93	88	89
WARM UP FACTOR	135-190	143	146	144	143	152	168	164	154	147
30 DAY AVERAGE	140-185	151	148	142	144	142	152	148	145	145

21 tank

M. D. RIEHLE

APR 8 1975

2* DOES NOT APPLY TO C GRADE
3* APPLIES TO H AND ML GRADES ONLY
4* MAX 446 APPLIES TO I GRADE ONLY

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

LOS ANGELES REFINERY PRODUCTS REPORT

REG 76 GASO (LOW-LEAD)

TANK NUMBER	SPEC SHEET	B-100510	B-100538	B-100536	B-100522	B-100524	B-100538	B-100522	B-378	100536
SAMPLE NUMBER	G-4	2024	2059	2154	2222	2264	2287	2296	2310	2356
DATE BLEND COMPLETED	DATED	02-20-73	02-21-73	02-25-73	02-27-73	03-01-73	03-04-73	03-05-73	03-06-73	03-07-73
BARRELS BLENDED	07/01/72	34.6	34.6	29.6	54.3	34.6	59.2	29.7	29.7	39.6
GRADE		ML	H	ML	ML	ML	H	ML	I	ML
U90 UNIFINED C5/C6			10.89	1.47	1.07	0.46		9.68	21.49	9.96
UNISOL LT CAT GASO		22.22	19.24	13.62	13.82	14.50	22.75	13.40	23.74	26.75
U33 AVIA BASE STOCK			9.61				7.43		6.16	
MLB ALKY GASO		6.15								
BLENDING BUTANE		2.22	3.99	8.86	9.16	9.30		9.64	7.46	0.37
U120 LT UNICRACKATE		31.48		33.48	33.67	30.91	27.93	19.59		21.76
U60 REFORMATE		21.04	37.29	35.61	35.09	35.58	21.43	41.82	21.15	21.52
U60 UNIF HVY CAT GASO		3.32	2.08	3.40	3.38	3.41	0.99	0.99	1.02	2.73
U-110 MOTOR ALKY		9.14	11.77	3.51	3.76	5.81	19.44	4.85	18.93	16.88
U110 IC4		4.39	5.08							
GRAVITY API 60F		63.9	59.4	59.9	60.6	60.8	63.3	60.1	66.4	63.4
CORROSION 3 HOURS 122F	1 MAXIMUM					1A				
VAPOR PRESS REID 100F PSI	SPEC/RESULT	141MX116	124MX120	129MX116	129MX117	129MX115	90MX70	129MX117	118MX109	90MX77
V/L RATIO	22 MAX	118T21	124T18	122T18	122T20	122T16	130T1	122T20	124T19	122T1
30 DAY AVERAGE	20 MAX	20	8	19	19	19	7	20	17	17
GUMS SOLV WASHED MG/100 ML	4.0 MAX					0.2				
GUMS ISD MG/LITER						2.1				
ISD RATING	100 MAX					27				
OXIDATION STAB MINUTES	240 MIN					660				
DIAZO NUMBER	45 MAX					21				
NAPHTHALENES FTM VOL PCT						0.74				
BROMINE NUMBER G/100G	28 MAX	22	19	13	13	15	23	15		26
SULFUR WEIGHT PCT	0.15 MAX					0.02				
MERCAPTAN SULFUR PPM	6.0 MAX	1.9	1.6	1.2	0.9	1.3	2.4	2.1	1.3	1.5
TEL G/GAL CALCULATED	0.60MAX 3*	0.54	0.53	0.57	0.54	0.54	0.54	0.55	0.49	0.49
KR MOTOR INT COMP RESULT		85.52	85.42	85.66	85.54	85.55	85.53	85.48	85.42	85.19
KR RESEARCH INT COMP RES	93.5 MIN 1*	93.99	93.93	93.84	93.78	93.78	93.85	93.70	93.47	93.93
30 DAY AVERAGE	93.8 MIN 1*	93.84	94.07	93.85	93.83	93.82	93.98	93.81	92.34	93.82
ROAD RATING CALC	91.4 MIN 4*	91.00	91.72	91.90	91.81	91.82	91.80	91.76	91.72	91.54
30 DAY AVERAGE	91.7 MIN 4*	92.06	91.74	92.05	92.03	92.01	91.77	91.96	92.11	91.86
MAX DEGREES F	432 MAX	410	408	417	421	420	395	403	400	413
RECOVERY PCT	95 MIN 2*	96.0	95.5	960	97.0	97.5	98.0	97.0	97.0	97.5
RESIDUE PCT	2.0 MAX	1.0	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX	417	409	417	417	418	403	417	406	417
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX108	140MX111	140MX104	150MX106	150MX112	150MX136	150MX106	150MX113	150MX126
PCT EVAP AT 180F		49.5	36.0	43	42.0	41.0	42.0	40.0	49.0	46.5
PCT EVAP AT 210F		63	47.0	52	52.0	52.0	59.5	50.0	63.0	60.5
PCT EVAP AT 250F		76	60.0	63	63.5	65.0	77.0	62.0	76.0	74.5
PCT EVAP AT 300F	70 MIN	84	74.0	74	74	77	87	75	86	85
WARM UP FACTOR	135-190	188	143	158	150	158	178	152	188	182
30 DAY AVERAGE	140-185	159	159	160	160	160	163	160	178	164

1* NO RESEARCH SPEC. FOR I GRADE
2* DOES NOT APPLY TO C GRADE
3* I GRADE SPEC. 0.5 MAX., TT-607, 9-20-72
4* SPEC. CHANGE PER LETTER B-291, 11-14-72

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

LOS ANGELES REFINERY PRO[illegible]S REPORT

REGULAR 76 GASOLINE

TANK NUMBER	SPEC SHEET	B-378	B-100522	B-100536	B-60001	B-100524	B384/385	B-100538	B-100524	B-100510
SAMPLE NUMBER	G-4	1818	1832	1840	1923	1964	3035	3088	3096	3223
DATE BLEND COMPLETED	DATED	02-10-72	02-12-72	02-13-72	02-17-72	02-20-72	02-22-72	02-25-72	02-27-72	03-01-72
BARRELS BLENDED	09/29/71	24.7	24.7	29.6	49.5	24.7	34.5	74.2	69.2	44.4
GRADE		I	PL	ML	H	ML	C	H	ML	ML
U80 UNIFINED C5/C6		22.58	8.51	6.89					14.83	12.14
UNISOL LT CAT GASO		18.63	19.75	20.39	23.29	22.17	24.38	21.23	20.53	23.80
U33 AVIA BASE STOCK			9.42	8.14	5.62	1.01		11.43	8.51	4.18
U80 REFORMATE		1504	4.69							
U91 IC5		2.25	2.98	2.98						
MLB ALKY GASO			5.24					20.93		3.52
BLENDING BUTANE		0.99	4.98	5.42			9.22			
U120 LT UNICRACKATE			4.39	4.87	15.91	22.22	19.59	10.59		
U60 REFORMATE		28.65	30.99	31.72	29.18	31.60	38.49	27.29	33.31	36.57
U60 UNIF HVY CAT GASO		5.58	6.02	6.36	7.34	7.14	5.52	6.45	4.75	5.06
U-110 MOTOR ALKY		6.24		6.77	17.60	13.11			10.03	14.70
BUTANE-BUTENE				3.42	1.01	1.84	2.77	2.05		
U110 IC4			2.98	2.98						
GRAVITY API 60F		58.2	58.9	59.0	58.8	58.2	59.3	58.2	58.7	57.2
CORROSION 3 HOURS 122F	1 MAXIMUM									1A
VAPOR PRESS REID 100F PSI	SPEC/RESULT	121MX115	141MX126	141MX129	80MX76	90MX84	145MX140	80MX75	90MX90	90MX84
V/L RATIO	22 MAX	124T19	118T18	118T18	130T1	122T0	112T20	130T1	122T1	122T1
30 DAY AVERAGE	20 MAX	19	19	19	17			13	11	9
GUMS SOLV WASHED MG/100 ML	4.0 MAX				1.2					0.2
GUMS 150 MG/LITER										2.2
?SD RATING	100 MAX									26
OXIDATION STAB MINUTES	240 MIN									420+
DIAZO NUMBER	45 MAX									46
NAPHTHALENES ETH VOL PCT										0.7
BROMINE NUMBER G/100G	28 MAX		19	20	19	21		21	19	22
SULFUR WEIGHT PCT	0.15 MAX									0.03
MERCAPTAN SULFUR PPM	6.0 MAX	1.1	1.2	1.2	1.8	1.6	1.0	1.3	0.9	1.0
TEL G/GAL CALCULATED	0.5 MAX	0.50	0.496	0.491	0.50	.50	0.38	0.50	0.50	0.50
KR MOTOR INT COMP RESULT		85.49	85.41	85.43	85.39	85.44	85.07	85.42	85.42	85.46
KR RESEARCH INT COMP RES	93.5 MIN	94.88	94.20	94.46	94.37	94.43	94.56	94.24	93.89	94.50
30 DAY AVERAGE	93.8 MIN	94.54	94.56	94.55	94.52	94.49		94.47	94.39	94.38
ROAD RATING CALC	91.9 MIN	92.27	92.21	92.23	92.20	92.23	179.63	92.22	92.22	92.25
30 DAY AVERAGE	92.2 MIN	92.25	92.25	92.25	92.24	92.24		92.25	92.25	92.25
MAX DEGREES F	432 MAX	427	419	417	427	430	422	424	429	421
RECOVERY PCT	95 MIN	96.5	96.0	96.0	96.5	98.0	97.0	97.5	98.0	97.0
RESIDUE PCT	2.0 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX	426	425	425	425	425.51		424	425	425
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX105	140MX107	140MX104	150MX135	150MX130	150MX97	150MX141	147MX129	147MX130
PCT EVAP AT 180F		40.0	38.0	40.0	32	35.0	40.5	30.5	33.0	30.0
PCT EVAP AT 210F		48.0	49.0	49.5	44	47.5	48.5	45.5	45.0	41.5
PCT EVAP AT 250F		59.0	61.0	61.5	62	62.0	58.5	64.0	61.0	56.5
PCT EVAP AT 300F	70 MIN	73	74	75	76	74	72	78	76	72
WARM UP FACTOR	135-175 1*	147	148	151	140	144	148	140	139	128-131
30 DAY AVERAGE	140-170 1*	152	151	151	150	150		146	145	143

*1 PER TT-66, 2-3-72, MINIMUM WUF SPECS. REDUCED 5 NUMBERS FOR PERIOD 3-1 TO 4-15-72

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

REGULAR 76 GASOLINE [illegible]

BLEND NUMBER	15	18	20	25	30	31	34
TANK NUMBER	1012	1012	1005	1012	241	1012	1012
DATE COMPLETED	2-12-71	2-15-71	2-20-71	2-27-71	3 -6-71	3 -7-71	3-11-71
BARRELS BLENDED	48414..	58652.	72969.	38622.	29329.	24393.	53398.
GRADE OF BLEND	LC	LC	LW	LC	LW	LC	LC
V/L TEMPERATURE	112.	112.	112.	112.	122.	112.	112.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	13.7	15.3	11.3	11.9	0.0	21.7	25.7
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	20.1	23.4	25.1	23.3	33.1	23.2	23.0
L.S.T.P.	49.9	46.1	49.4	50.1	48.7	46.7	45.0
BUTANE	8.0	8.2	7.6	8.3	0.0	3.4	3.0
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	8.3	7.0	6.6	6.3	18.1	4.9	3.3
TOTAL	100.0	100.0	100.0	99.9	99.9	99.9	100.0
BLEND QUALITY							
GRAVITY API	60.2	60.5	60.1	59.9	58.3	59.7	59.1
R.V.P.	12.5	12.7	12.0	11.7	7.2	10.7	9.5
V/L RATIO	8.8	9.7	6.8	4.4	0.2	5.4	0.8
30 DAY AVE	4.6	6.4	6.5	7.5	6.7	6.6	5.5
10 PCT POINT	104.0	103.0	104.0	107.0	129.0	113.0	112.0
MAX DEG.F BLEND	412.0	400.0	404.0	409.0	428.0	418.0	418.0
30 DAY AVE	416.2	412.7	410.5	405.5	408.2	409.1	410.5
W.U.F. BLEND	152.8	164.2	165.1	159.0	148.7	163.4	161.6
30 DAY AVE	148.6	152.6	155.7	161.0	159.5	159.9	160.2
EVAP. AT 300 F	82.6	84.3	83.5	82.3	81.0	82.0	81.8
RECOVERY PCT	95.0	95.3	96.0	96.0	97.0	96.9	96.2
RESIDUE PCT	1.3	1.3	1.5	1.5	1.4	1.4	1.5
RSH PPM	2.000	1.600	1.800	1.900	1.400	2.100	2.600
30 DAY AVE	1.827	1.892	1.869	1.808	1.760	1.790	1.923
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.43	0.44	0.44	0.48	0.44	0.51	0.53
KRR BLEND	94.30	95.00	94.80	95.10	94.10	95.40	95.50
30 DAY AVE	94.69	94.55	94.61	94.79	94.71	94.77	94.89
KRM BLEND	85.10	85.20	84.90	85.10	85.10	84.80	84.60
ROAD OCT. BLEND	92.70	93.00	92.70	92.90	92.60	92.90	92.80
30 DAY AVE	92.98	92.88	92.84	92.81	92.79	92.80	92.80
IO. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.60	0.40	0.40	0.40	0.40	0.40
SULFUR	0.000	0.000	0.000	0.000	0.000	0.065	0.000

SUPER 76 GASOLINE   SAN FRANCISCO REFINERY   PRODUCTS REPORT

BLEND NUMBER	24	23	29	35	38	44	43A
TANK NUMBER	243	242	1004	1004	1004	243	242
DATE COMPLETED	2-26-71	3 -4-71	3 -4-71	3-14-71	3-19-71	3-25-71	3-27-71
BARRELS BLENDED	24803.	29566.	19584.	50719.	44191.	19703.	42210.
GRADE OF BLEND	W	W	C	C	C	W	W
V/L TEMPERATURE	122.	122.	112.	122.	112.	122.	122.

COMPOSITION (VOL. PCT.)

LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAR ALKYLATE	4.6	0.0	0.0	0.0	0.0	0.0	0.0
LAR REFORMATE	7.2	7.7	9.1	8.5	9.1	11.4	6.0
BUTANE	6.8	0.0	6.1	6.4	6.0	0.9	2.0
L.S.T.P.	42.6	48.4	49.7	49.0	49.2	43.7	49.9
C5-C6	9.6	0.0	10.0	9.2	10.4	0.0	0.0
LT. WAXY GASO.	10.3	14.3	11.2	12.9	11.5	12.5	15.[illegible]
LT. CAT.	18.8	29.5	13.9	13.9	13.8	26.5	26.1
TOTAL	99.9	100.0	100.0	99.9	100.0	100.0	100.0

BLEND QUALITY

GRAVITY API	57.9	54.6	56.4	55.1	55.2	55.5	54.7
R.V.P.	11.2	7.5	10.3	9.8	10.6	8.5	8.5
V/L RATIO	13.8	0.2	6.2	7.6	1.2	1.1	0.8
30 DAY AVE	9.1	8.0	7.9	8.6	7.4	6.9	6.0
10 PCT POINT	107.0	132.0	115.0	116.0	115.0	123.0	127.0
MAX DEG.F BLEND	408.0	419.0	412.0	424.0	414.0	418.0	415.0
30 DAY AVE	406.3	407.8	408.1	411.2	411.7	414.6	414.7
W.U.F. BLEND	152.3	144.4	146.4	140.0	141.9	146.2	146.4
30 DAY AVE	154.5	153.3	152.8	149.1	147.9	145.9	146.0
EVAP. AT 300 F	82.4	80.8	80.8	78.7	79.7	82.0	81.7
RECOVERY PCT	96.0	97.1	96.2	96.2	96.0	96.6	96.9
RESIDUE PCT	1.4	1.4	1.5	1.3	1.5	1.3	1.5
RSH PPM	2.900	1.200	1.200	1.600	1.700	2.200	1.500
30 DAY AVE	1.629	1.579	1.552	1.434	1.478	1.630	1.510
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.75	4.00	3.96	3.87	3.94	3.96	3.99
PCT TML	77.38	78.10	76.35	77.27	80.75	71.97	80.40
KRR BLEND	99.70	99.60	99.60	99.50	99.70	100.00	99.90
30 DAY AVE	99.47	99.48	99.49	99.51	99.54	99.59	99.64
KRM	91.00	89.90	90.50	90.70	91.00	90.10	90.40
ROAD OCTANE BLND	99.20	98.50	98.80	98.90	99.40	99.19	98.90
30 DAY AVE	99.08	99.01	98.99	98.86	98.95	98.94	98.93
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.20	0.20	1.20	0.80	0.80	0.60	0.40
SULFUR	0.040	0.050	0.050	0.040	0.050	0.050	0.050

REGULAR 73 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	33	39	40	47	50	60	61
TANK NUMBER	1010	1010	1006	1010	1006	1010	1006
DATE COMPLETED	3-10-71	3-20-71	3-21-71	4 -1-71	4 -4-71	4-19-71	4-20-71
BARRELS BLENDED	24197.	41111.	20523.	39042.	52546.	17642.	19237.
GRADE OF BLEND	HW	HW	HW	HW	HC	HW	HC
V/L TEMPERATURE	122.	122.	122.	132.	122.	132.	122.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	26.8	25.9	26.0	25.0	24.5	22.2	22.0
C5-C6	27.6	23.5	25.2	22.5	19.0	24.2	24.0
L.S.T.P.	45.6	44.1	43.4	50.8	51.5	53.5	54.0
BUTANE	0.0	6.5	5.4	1.7	5.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	99.9	100.0
BLEND QUALITY							
GRAVITY API	59.1	59.0	59.4	58.5	59.0	58.3	58.2
R.V.P.	9.8	9.5	10.1	8.7	10.5	7.5	9.7
V/L RATIO	4.4	5.5	6.0	10.0	7.8	5.5	4.3
30 DAY AVE	3.8	4.4	4.5	6.9	6.6	7.2	7.4
10 PCT POINT	117.0	117.0	114.0	119.0	114.0	125.0	117.0
MAX DEG.F BLEND	418.0	422.0	408.0	404.0	423.0	408.0	421.0
30 DAY AVE	410.8	414.0	413.5	413.8	415.3	415.0	413.9
W.U.F. BLEND	165.7	167.0	169.2	165.0	164.6	154.5	160.0
30 DAY AVE	166.8	166.3	166.5	165.6	166.2	164.7	163.5
EVAP. AT 300 F	82.5	83.0	83.8	83.9	82.3	80.2	82.7
RECOVERY PCT	96.5	96.2	96.2	96.9	96.7	96.5	96.5
RESIDUE PCT	1.4	1.3	1.5	1.2	1.5	1.5	1.4
RSH PPM	1.500	1.500	1.800	2.200	2.100	2.100	2.000
30 DAY AVE	1.531	1.462	1.487	1.701	1.853	1.942	2.071
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.07	2.17	1.98	1.91	1.90	1.77	1.75
KRR BLEND	94.10	94.20	94.20	94.40	94.30	94.50	94.50
30 DAY AVE	94.05	94.08	94.09	94.14	94.20	94.30	94.3[illegible]
KRM BLEND	86.50	86.20	86.40	86.60	86.00	86.20	86.10
ROAD OCT. BLEND	93.00	92.90	93.00	93.10	92.80	93.00	92.90
30 DAY AVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.40	0.40	0.20	0.60	0.20	0.40	0.40
SULFUR	0.044	0.000	0.050	0.000	0.040	0.000	0.030

REGULAR 75 GASOLINE LOWLW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	37	41	42	45	46	48	54
TANK NUMBER	1005	1005	241	1005	1005	1005	1012
DATE COMPLETED	3-17-71	3-22-71	3-23-71	3-26-71	3-28-71	3-31-71	4 -9-71
BARRELS BLENDED	48775.	38971.	19511.	38934.	24010.	32979.	43593.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	122.	122.	122.	122.	122.	132.	132.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	17.1	23.6	0.0	0.0	0.0	0.0	14.1
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	26.5	20.5	30.4	32.6	32.2	31.1	23.4
L.S.T.P.	46.9	46.3	50.6	49.5	49.8	51.0	51.2
BUTANE	3.9	4.0	1.7	0.1	0.4	1.3	0.0
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	5.6	5.6	17.3	17.8	17.6	15.6	11.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	99.9
BLEND QUALITY							
GRAVITY API	59.7	59.4	58.8	59.2	59.0	59.1	58.2
R.V.P.	9.8	10.4	8.3	7.7	7.5	7.9	8.0
V/L RATIO	6.3	7.3	1.2	0.4	0.2	2.8	2.8
30 DAY AVE	5.2	4.6	3.8	3.3	3.1	2.9	2.9
10 PCT POINT	113.0	112.0	124.0	123.0	128.0	127.0	129.0
MAX DEG.F BLEND	413.0	416.0	425.0	415.0	403.0	404.0	428.0
30 DAY AVE	410.7	413.4	417.0	416.7	415.7	415.3	415.7
W.U.F. BLEND	161.2	168.0	150.2	156.4	151.5	147.0	152.2
30 DAY AVE	161.4	161.7	159.9	159.4	158.8	157.5	157.1
EVAP. AT 300 F	82.1	83.5	81.5	83.0	83.0	82.2	81.2
RECOVERY PCT	97.2	96.0	96.7	97.0	97.3	97.2	97.2
RESIDUE PCT	1.5	1.5	1.3	1.5	1.5	1.1	1.1
RSH PPM	2.600	2.400	1.800	1.700	1.800	1.300	2.300
30 DAY AVE	2.012	2.141	2.213	2.144	2.118	2.058	2.15
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.50	0.37	0.37	0.53	0.49	0.43	0.41
KRR BLEND	95.10	95.30	94.50	94.30	94.90	94.00	95.10
30 DAY AVE	95.01	95.05	95.08	94.97	94.97	94.85	94.91
KRM BLEND	84.80	84.60	85.30	85.30	85.70	85.30	85.00
ROAD OCT. BLEND	92.80	92.80	92.90	92.80	93.20	92.70	92.90
30 DAY AVE	92.81	92.77	92.80	92.80	92.83	92.81	92.84
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	0.20	0.20	0.20	0.00	0.00	0.40
SULFUR	0.000	0.000	0.000	0.000	0.000	0.060	0.000

SUPER 76 GASOLINE   SAN FR[illegible]   [illegible] REPORT

BLEND NUMBER	91	92	97	101	105	112	115A
[illegible]K NUMBER	1004	242	1004	1004	1004	1004	1004
DATE COMPLETED	6 -1-71	6 -2-71	6 -8-71	6-15-71	6-25-71	7 -5-71	7-13-71
BARRELS BLENDED	39628.	22893.	32356.	33898.	35544.	56122.	25259.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.

COMPOSITION (VOL. PCT.)

LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAR ALKYLATE	0.0	0.0	0.0	0.0	0.0	16.7	3.2
LAR REFORMATE	20.8	15.1	18.2	16.5	18.0	0.0	24.6
BUTANE	3.2	3.5	3.7	4.2	3.2	3.5	3.2
L.S.T.P.	42.7	45.6	44.3	46.8	45.2	46.6	36.4
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	23.8	26.1	25.1	21.2	22.2	21.6	16.7
LT. CAT.	9.5	9.7	8.7	11.4	11.3	11.6	12.8
LUN	0.0	0.0	0.0	0.0	0.0	0.0	3.0
TOTAL	100.0	100.0	100.0	100.1	99.9	100.0	99.9

BLEND QUALITY

GRAVITY API	53.4	53.4	53.3	54.2	54.3	58.0	55.1
R.V.P.	8.8	8.7	6.5	8.9	7.0	8.8	8.6
V/L RATIO	12.5	11.9	12.7	15.0	14.6	15.4	12.0
30 DAY AVE	7.3	7.6	8.4	10.1	13.3	14.5	14.5
10 PCT POINT	127.0	125.0	129.0	119.0	123.0	128.0	127.0
MAX DEG.F BLEND	411.0	416.0	424.0	414.0	406.0	406.0	426.0
30 DAY AVE	424.5	423.9	423.2	421.1	414.6	411.4	411.1
W.U.F. BLEND	133.9	134.9	133.5	141.0	134.4	130.4	135.4
30 DAY AVE	131.3	131.6	130.6	131.8	134.0	134.2	134.5
EVAP. AT 300 F	82.0	81.5	81.7	82.5	83.6	83.5	81.9
RECOVERY PCT	96.9	96.5	96.9	95.0	96.0	97.0	96.0
RESIDUE PCT	1.4	1.5	1.4	1.5	1.4	1.5	1.6
RSH PPM	1.900	0.800	0.900	3.400	1.600	1.000	1.200
30 DAY AVE	1.172	1.146	1.099	1.315	1.620	1.629	1.714
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.89	3.87	3.76	3.85	3.85	3.74	3.89
PCT TML	79.80	80.79	79.89	79.71	80.07	79.89	80.57
KRR BLEND	99.50	99.50	99.60	99.60	99.50	99.50	99.60
30 DAY AVE	99.55	99.54	99.54	99.55	99.59	99.54	99.53
KRM	91.50	91.50	91.20	91.30	91.20	91.40	91.90
[illegible]D OCTANE BLND	100.20	100.10	100.60	100.00	99.80	100.10	99.97
[illegible]0 DAY AVE	99.97	99.98	100.05	100.09	100.11	100.11	99.98
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	1.00	1.00	1.00	0.00	0.20	1.00
SULFUR	0.020	0.020	0.010	0.020	0.030	0.020	0.028

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	120	122	125	131	133	140A	143
TANK NUMBER	1005	1012	1005	1012	1005	1012	1005
DATE COMPLETED	7-27-71	7-30-71	8 -4-71	8-12-71	8-18-71	8-28-71	8-31-71
BARRELS BLENDED	41134.	72593.	78822.	83803.	67396.	93226.	65372.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.

COMPOSITION (VOL. PCT.)

LAR LT. CAT	21.3	21.4	11.3	14.2	11.6	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	22.3	22.3	23.1	40.2	0.0	24.1	25.0
L.S.T.P.	34.5	34.6	30.8	38.1	47.2	45.0	43.0
BUTANE	2.2	2.2	3.1	3.4	0.8	2.8	2.5
LUK	0.0	0.0	2.0	4.1	35.0	8.4	9.4
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	11.8	11.7	27.7	0.0	5.4	19.7	20.1
ALKYLATE	7.8	7.9	2.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.1	100.0	100.0	100.0	100.0	100.0

BLEND QUALITY

GRAVITY API	57.7	57.8	55.5	56.0	56.9	54.0	54.5
R.V.P.	8.7	8.7	6.0	8.5	8.3	8.7	8.7
V/L RATIO	15.6	15.6	13.4	15.2	19.6	14.0	19.1
30 DAY AVE	15.6	15.6	15.3	14.8	15.7	15.3	15.9
10 PCT POINT	124.0	124.0	123.0	123.0	122.0	123.0	129.0
MAX DEG.F BLEND	426.0	419.0	417.0	415.0	424.0	423.0	428.0
30 DAY AVE	417.9	418.2	423.8	418.2	419.3	419.5	421.0
W.O.F. BLEND	157.3	152.3	143.8	148.6	155.4	137.9	141.5
30 DAY AVE	159.6	157.9	153.0	149.4	150.6	146.9	145.0
EVAP. AT 300 F	80.9	80.8	82.6	82.0	77.4	79.3	78.1
RECOVERY PCT	97.0	97.0	97.0	97.0	96.9	97.0	97.0
RESIDUE PCT	1.7	1.7	1.5	1.3	1.5	1.5	1.9
RSH PPM	1.500	1.800	1.800	2.400	3.500	1.000	1.200
30 DAY AVE	1.351	1.454	1.579	1.937	2.243	2.028	[illegible]
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.49	0.50	0.45	0.46	0.49	0.49	0.48
KRR BLEND	95.40	95.40	95.40	95.30	94.90	95.10	94.90
DAY AVE	95.02	95.11	95.34	95.36	95.27	95.22	95.13
K[illegible] BLEND	84.90	84.80	85.00	84.80	85.40	85.60	85.40
R[illegible]D OCT. BLEND	92.90	92.90	93.00	92.80	93.00	93.20	93.00
30 DAY AVE	92.96	92.95	92.95	92.89	92.91	92.98	93.00
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.80	0.60	0.00	0.80	0.40	0.40	0.60
SULFUR	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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SUPER 76 GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

END NUMBER	57	59	61	66	68	74	~~76~~
TANK NUMBER	1004	1004	1004	1004	1004	1004	1004
DATE COMPLETED	3-25-72	3-27-72	3-31-72	4 -4-72	4 -7-72	4-16-72	4-20-72
BARRELS BLENDED	69587.	48764.	59455.	19857.	48694.	49821.	65482.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LUK	37.9	38.1	38.4	3.6	32.8	27.1	27.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	23.9	24.2	23.4	39.2	12.4	25.5	25.5
BUTANE	1.3	0.6	0.9	3.4	0.3	1.7	1.6
L.S.T.P.	36.9	37.1	37.2	21.6	49.9	25.5	24.3
C5-C6	0.0	0.0	0.0	0.0	0.0	20.2	21.6
LT. WAXY GASO.	0.0	0.0	0.0	32.1	4.7	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	99.9	99.9	100.1	100.0	100.0
BLEND QUALITY							
GRAVITY API	56.0	55.5	56.2	54.1	55.2	57.9	58.6
R.V.P.	8.7	8.2	8.0	8.5	8.2	6.4	9.0
V/L RATIO	7.8	2.2	6.0	3.6	8.2	12.8	12.8
30 DAY AVE	4.6	4.4	4.9	4.6	5.5	6.3	8.1
10 PCT POINT	122.0	122.0	121.0	136.0	131.0	121.0	121.0
MAX DEG.F BLEND	413.0	415.0	419.0	406.0	421.0	407.0	407.0
30 DAY AVE	409.6	410.1	412.4	411.1	413.4	412.3	413.0
W.U.F. BLEND	145.7	146.7	147.2	131.6	138.5	169.7	170.0
30 DAY AVE	145.1	145.2	146.4	145.5	143.8	146.5	152.0
EVAP. AT 300 F	79.6	81.2	79.9	81.5	78.1	83.3	85.6
RECOVERY PCT	96.5	96.5	97.0	96.9	97.0	97.0	97.5
RESIDUE PCT	1.4	1.3	1.2	1.4	1.4	1.2	0.9
RSH PPM	1.000	0.900	0.000	0.500	0.600	2.000	3.200
30 DAY AVE	0.702	0.721	0.652	0.662	0.650	0.814	1.276
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.48	2.40	2.50	3.48	3.49	3.81	3.94
PCT TML	80.69	78.77	79.89	79.59	88.88	80.66	81.38
KRR BLEND	99.50	99.50	99.51	99.51	99.51	99.50	99.52
30 DAY AVE	99.51	99.51	99.51	99.50	99.50	99.50	99.50
RM	93.12	92.54	92.65	92.12	92.46	92.93	92.15
OAD OCTANE BLND	101.42	101.17	101.22	101.08	101.23	100.84	99.80
30 DAY AVE	101.14	101.14	101.21	101.19	101.23	101.19	100.93
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.20	0.40	0.60	0.20	0.60	0.20	0.00
SULFUR	0.001	0.001	0.003	0.003	0.006	0.038	0.043

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	75	78	82A	84	90	94	99
TANK NUMBER	1001	1001	1001	1005	1005	1001	1005
DATE COMPLETED	4-17-72	4-23-72	4-30-72	4-30-72	5 -5-72	5-10-72	5-17-72
BARRELS BLENDED	38777.	41791.	62616.	19209.	57808.	64267.	63870.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.

COMPOSITION (VOL. PCT.)

LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	1.3	0.0	0.0	0.0	14.0
C5-C6	10.2	11.2	18.4	20.2	23.1	21.4	0.0
L.S.T.P.	30.0	30.8	21.0	24.6	21.1	20.1	12.8
BUTANE	0.0	0.0	3.9	0.0	2.9	3.1	3.5
LUK	21.9	21.2	13.7	13.6	15.0	15.1	19.8
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	37.9	36.7	41.8	41.6	38.0	40.3	44.3
L.U.N.	0.0	0.0	0.0	0.0	0.0	0.0	5.6
TOTAL	100.0	99.9	100.1	100.0	100.1	100.0	100.0
	67.9	68.5	61.8	66.2	59.1	60.1	57.1

BLEND QUALITY

GRAVITY API	52.5	53.0	53.6	53.5	54.5	54.6	54.4
R.V.P.	6.5	7.2	8.8	9.1	8.5	8.6	8.7
V/L RATIO	1.0	0.8	5.0	1.0	5.8	5.8	3.6
30 DAY AVE	2.1	1.7	2.7	2.6	3.2	3.9	3.8
10 PCT POINT	131.0	133.0	130.0	126.0	124.0	124.0	134.0
MAX DEG.F BLEND	407.0	406.0	410.0	404.0	400.0	396.0	392.0
30 DAY AVE	389.2	391.4	406.5	406.2	404.9	403.4	401.3
W.O.F. BLEND	130.4	131.3	129.2	131.1	140.3	140.5	133.5
30 DAY AVE	131.4	131.5	128.3	128.6	131.1	134.6	134.4
EVAP. AT 300 F	82.2	82.0	79.3	80.3	80.8	82.1	83.0
RECOVERY PCT	97.0	97.0	97.0	96.5	96.3	96.5	97.0
RESIDUE PCT	1.4	1.5	1.2	1.2	1.4	1.4	1.3
RSH PPM	2.000	1.800	1.800	2.000	1.000	1.400	1.400
30 DAY AVE	1.774	2.033	2.117	2.106	1.867	1.587	1.553
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.50	0.43	0.47	0.48	0.44	0.48	0.47
KRR BLEND	96.77	96.62	96.79	96.45	96.54	96.88	96.21
30 DAY AVE	96.72	96.80	96.73	96.71	96.67	96.70	96.61
KRM BLEND	86.08	86.11	86.13	86.15	86.06	86.09	86.01
1D OCT. BLEND	92.72	92.74	92.76	92.77	92.71	92.73	92.67
30 DAY AVE	92.71	92.71	92.73	92.73	92.73	92.73	92.72
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]
GUMS.EX.MG/100ML	0.60	0.40	0.40	0.20	0.00	0.00	[illegible]
SULFUR	0.030	0.038	0.033	0.035	0.027	0.027	[illegible]

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	111	113	117	118	124	128	131
TANK NUMBER	241	1010	241	1010	1006	1010	1006
DATE COMPLETED	5-31-72	6 -4-72	6 -6-72	6 -7-72	6-16-72	6-20-72	6-22-72
BARRELS BLENDED	28840.	25165.	19298.	45607.	48194.	35774.	29005.
GRADE OF BLEND	HC	HW	HC	HW	HW	HW	HW
V/L TEMPERATURE	127.	140.	127.	140.	140.	140.	140.

COMPOSITION (VOL. PCT.)

LUK	0.0	0.0	0.0	0.0	0.0	1.4	0.0
LT. WAXY GASO.	0.0	28.4	22.8	29.8	27.3	28.6	46.4
C5-C6	23.3	15.6	26.4	20.5	25.0	25.0	0.0
L.S.T.P.	50.3	54.7	37.5	45.6	44.8	43.8	49.3
BUTANE	5.8	0.0	5.6	0.0	1.7	1.3	2.7
LUN	20.6	1.4	0.0	0.0	1.2	0.0	1.7
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	7.7	4.1	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.1	100.0	100.0	100.0	100.1	100.1

BLEND QUALITY

GRAVITY API	61.0	55.7	60.5	56.7	58.9	58.7	57.2
R.V.P.	10.8	7.5	10.4	7.6	8.4	8.7	6.5
V/L RATIO	16.4	5.2	16.2	6.0	19.0	17.5	15.2
30 DAY AVE	8.5	8.0	8.2	8.2	8.4	8.8	8.9
10 PCT POINT	113.0	136.0	115.0	132.0	126.0	126.0	129.0
MAX DEG.F BLEND	417.0	424.0	420.0	425.0	414.0	416.0	412.0
30 DAY AVE	418.6	420.0	420.0	420.3	420.1	419.8	419.6
W.U.F. BLEND	156.9	128.6	153.7	141.3	153.2	155.5	143.1
30 DAY AVE	155.5	153.8	153.7	153.4	153.2	153.9	153.6
EVAP. AT 300 F	82.7	75.9	79.9	82.4	80.6	80.4	79.1
RECOVERY PCT	96.0	97.3	96.5	97.2	97.0	97.0	96.1
RESIDUE PCT	1.2	1.5	1.9	1.6	1.2	1.2	1.5
RSH PPM	1.000	1.500	1.000	1.300	1.300	2.800	2.000
30 DAY AVE	1.630	1.632	1.619	1.612	1.615	1.660	1.682
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.15	2.72	2.19	2.83	2.84	2.73	2.97
KRR BLEND	93.81	93.82	93.80	93.81	93.80	93.82	93.89
30 DAY AVE	93.81	93.81	93.81	93.81	93.81	93.81	93.81
KRM BLEND	87.30	86.85	87.03	87.30	87.25	86.81	88.28
AD OCT. BLEND	93.95	93.61	93.75	93.95	93.91	93.57	94.69
30 DAY AVE	94.44	94.35	94.34	94.33	94.32	94.31	94.33
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.60	0.00	0.40	0.40	0.40	0.40	0.60
SULFUR	0.023	0.027	0.024	0.033	0.042	0.050	0.015

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	148	151	156	0161	0163	169	176
TANK NUMBER	241	1010	241	1006	1010	1006	1010
DATE COMPLETED	7-15-72	7-17-72	7-23-72	7-26-72	7-30-72	8 -4-72	8-10-72
BARRELS BLENDED	14660.	23529.	53656.	38558.	49806.	28733.	50025.
GRADE OF BLEND	HC	HW	HC	HW	HW	HW	HW
V/L TEMPERATURE	127.	140.	127.	140.	140.	140.	140.

COMPOSITION (VOL. PCT.)

LUK	0.0	0.0	0.0	0.0	0.0	10.6	0.0
LT. WAXY GASO.	9.4	15.5	22.7	19.9	24.4	39.8	33.9
C5-C6	20.9	22.9	19.9	23.6	16.8	0.0	17.3
L.S.T.P.	50.2	50.3	43.0	46.9	50.2	48.1	46.9
BUTANE	7.0	2.3	5.4	2.2	2.6	1.0	1.8
LUN	12.5	9.0	8.9	7.5	6.0	0.4	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	99.9	100.1	100.0	99.9	99.9

BLEND QUALITY

GRAVITY API	59.2	57.0	58.9	57.8	57.3	57.8	57.8
R.V.P.	10.6	8.6	10.7	8.8	7.2	8.4	8.5
V/L RATIO	16.4	14.0	16.0	15.6	14.4	14.2	15.4
30 DAY AVE	15.8	15.1	15.0	15.1	14.8	14.8	15.0
10 PCT POINT	114.0	126.0	114.0	125.0	129.0	132.0	127.0
MAX DEG.F BLEND	420.0	426.0	419.0	421.0	423.0	419.0	428.0
30 DAY AVE	417.3	418.4	419.4	419.6	421.4	421.1	421.8
W.U.F. BLEND	142.8	137.0	151.8	141.8	139.3	142.0	146.5
30 DAY AVE	144.7	142.8	142.9	142.7	142.1	142.3	143.8
EVAP. AT 300 F	78.0	77.2	80.5	78.1	78.2	79.5	79.1
RECOVERY PCT	96.0	96.8	96.7	96.0	96.6	97.1	96.5
RESIDUE PCT	1.5	1.2	1.3	1.3	1.3	1.4	1.5
RSH PPM	2.600	1.800	1.000	2.600	2.200	0.600	1.900
30 DAY AVE	1.518	1.572	1.285	1.433	1.590	1.569	1.725
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.22	2.84	2.81	3.03	2.93	2.80	3.07
KRR BLEND	93.80	93.80	93.81	93.82	93.81	93.79	93.81
30 DAY AVE	93.82	93.83	93.82	93.82	93.82	93.80	93.80
KRM BLEND	87.05	87.36	87.20	87.08	87.47	87.25	87.58
ROAD OCT. BLEND	93.76	93.99	93.87	93.78	94.08	93.91	[illegible]
30 DAY AVE	93.81	93.81	93.76	93.76	93.83	93.88	[illegible]
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]
GUMS.EX.MG/100ML	0.40	0.00	0.40	0.40	0.20	[illegible]	[illegible]
SULFUR	0.025	0.036	0.029	0.030	0.030	0.012	[illegible]

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	174	177	180	182	188	191	194
TANK NUMBER	288	1001	287	288	1001	1002	287
DATE COMPLETED	8 -8-72	8-13-72	8-15-72	8-19-72	8-24-72	8-30-72	9 -2-72
BARRELS BLENDED	49726.	50435.	54040.	52225.	66461.	50099.	49884.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	9.1	0.0	0.0	2.7	9.6	3.5	13.0
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.T.P.	17.5	24.7	24.2	28.7	28.8	38.7	39.3
BUTANE	2.2	3.1	2.4	2.6	1.3	2.5	2.2
LUK	24.3	25.4	26.4	25.9	26.2	25.9	22.9
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	38.8	33.7	34.8	32.0	31.8	22.9	22.6
L.U.N.	8.1	13.1	12.2	8.1	2.2	6.4	0.0
TOTAL	100.0	100.0	100.0	100.0	99.9	99.9	100.0
BLEND QUALITY							
GRAVITY API	55.1	55.1	55.1	55.0	54.8	54.5	54.8
R.V.P.	8.6	8.8	8.7	8.9	8.6	6.8	8.7
V/L RATIO	15.8	17.0	15.6	17.2	14.3	15.5	14.7
30 DAY AVE	15.8	16.0	15.9	16.3	15.9	16.0	16.0
10 PCT POINT	129.0	121.0	129.0	129.0	126.0	130.0	125.0
MAX DEG.F BLEND	390.0	399.0	395.0	422.0	405.0	412.0	417.0
30 DAY AVE	395.0	393.3	393.5	393.7	395.6	400.2	403.0
W.U.F. BLEND	139.0	138.9	138.7	127.0	142.0	131.5	134.9
30 DAY AVE	133.8	135.1	135.4	136.2	137.3	138.4	137.6
EVAP. AT 300 F	83.0	81.4	81.8	76.3	81.4	77.8	79.1
RECOVERY PCT	96.7	95.0	96.0	97.0	97.3	96.0	0.0
RESIDUE PCT	1.3	1.1	1.3	1.2	1.3	1.5	1.3
RSH PPM	0.800	0.400	0.900	1.400	1.800	1.400	1.000
30 DAY AVE	0.922	0.909	0.908	0.947	1.112	1.177	1.178
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.45	0.49	0.37	0.46	0.50	0.45	0.50
30 DAY AVE	0.45	0.46	0.45	0.45	0.46	0.45	0.46
KRR BLEND	94.70	95.31	95.23	94.73	94.12	94.41	94.64
30 DAY AVE	96.11	96.17	96.09	95.81	95.48	95.14	94.91
M BLEND	86.10	86.07	86.06	86.06	86.05	86.11	86.09
ROAD OCT. BLEND	92.74	92.71	92.70	92.70	92.70	92.75	92.73
30 DAY AVE	92.71	92.72	92.72	92.72	92.71	92.71	92.71
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	0.40	0.40	0.00	0.40	0.80	0.20
SULFUR	0.013	0.007	0.004	0.005	0.003	0.005	0.010

SUB - REGULAR C + W SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	175	181	185A	192	199	200	204
TANK NUMBER	60	1002	1003	1003	1003	1003	60
DATE COMPLETED	8-13-72	8-18-72	8-27-72	8-30-72	9-12-72	9-16-72	9-24-72
BARRELS BLENDED	30908.	54037.	64782.	29503.	58137.	31635.	40879.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	132.	132.

COMPOSITION (VOL. PCT.)

L.S.T.P.	34.2	50.6	47.7	48.7	48.9	48.5	55.6
LT. WAXY GASO.	42.9	35.0	20.0	27.1	0.0	0.0	5.5
C5-C6	0.0	6.6	13.0	21.9	14.3	15.3	14.[illegible]
LUN	21.1	7.9	19.4	0.0	32.5	32.7	20.7
BUTANE	1.8	0.0	0.0	2.2	3.8	3.9	2.[illegible]
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.1	100.1	99.9	100.0	99.9	100.0

BLEND QUALITY

GRAVITY API	59.7	56.9	57.7	58.2	57.6	57.5	57.0
R.V.P.	8.4	8.1	7.1	7.9	8.8	8.5	9.4
V/L RATIO	14.6	8.4	7.4	12.4	11.9	7.5	4.6
30 DAY AVE	12.5	11.5	9.7	10.0	10.2	9.3	8.7
10 PCT POINT	132.0	130.0	129.0	129.0	134.0	129.0	132.0
MAX DEG.F BLEND	416.0	423.0	422.0	425.0	428.0	429.0	422.0
30 DAY AVE	412.9	415.3	416.2	417.2	423.2	424.9	424.9
W.U.F. BLEND	153.6	136.8	149.9	145.4	135.8	139.7	131.0
30 DAY AVE	143.4	141.9	144.7	144.8	143.3	141.5	140.8
EVAP. AT 300 F	84.5	79.2	81.1	79.5	79.0	80.0	78.5
RECOVERY PCT	96.6	97.0	97.0	97.1	96.5	97.0	96.5
RESIDUE PCT	1.2	1.2	1.3	1.2	1.5	1.2	1.2
RSH PPM	1.200	0.800	1.100	1.300	1.000	1.200	0.400
30 DAY AVE	1.558	1.381	1.148	1.166	1.045	1.045	0.987
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.97	1.60	1.76	1.56	1.70	1.67	1.52
KRR BLEND	91.51	91.51	91.52	91.52	91.52	91.52	91.50
30 DAY AVE	91.51	91.51	91.51	91.51	91.51	91.51	91.51
KRM BLEND	87.05	85.82	84.98	84.57	85.41	85.19	85.70
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	270.00
GUMS.EX.MG/100ML	0.40	0.40	0.40	0.20	0.20	0.20	0.20
SULFUR	0.011	0.013	0.029	0.033	0.020	0.022	0.021

SUPER 73C GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	190	202	205	214	215	216	229
TANK NUMBER	61	1004	1002	61	1004	242	61
DATE COMPLETED	9 -1-72	9-22-72	9-29-72	10 -9-72	10-11-72	10-12-72	10-23-72
BARRELS BLENDED	35058.	69169.	74471.	19768.	34654.	34655.	24925.
GRADE OF BLEND	W	W	W	C	W	W	C
V/L TEMPERATURE	140.	132.	132.	107.	132.	132.	107.
COMPOSITION (VOL. PCT.)							
LUK	17.0	0.0	0.0	4.3	25.7	17.9	13.5
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	14.7	14.6	16.2	43.2	30.2	24.1
BUTANE	2.0	2.1	1.7	13.2	3.0	2.5	11.3
L.S.T.P.	62.2	49.5	50.4	45.6	0.4	30.0	34.3
C5-C6	18.8	25.0	26.9	20.7	27.6	19.4	15.2
LT. WAXY GASO.	0.0	8.6	6.4	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	99.9	100.0	100.0	99.9	100.0	100.0
BLEND QUALITY							
GRAVITY (API)	54.6	53.7	53.2	57.0	55.2	54.9	57.4
R.V.P.	8.7	9.0	8.4	11.3	8.6	7.2	12.5
V/L RATIO	15.0	5.6	5.4	2.2	5.5	6.4	6.3
30 DAY AVE	15.1	12.7	8.9	5.0	5.1	5.3	5.3
10 PCT POINT	123.0	123.0	121.0	106.0	127.0	127.0	103.0
MAX DEG.F BLEND	421.0	416.0	409.0	418.0	392.0	414.0	407.0
30 DAY AVE	420.6	419.2	416.7	413.0	409.3	410.0	407.4
W.U.F. BLEND	131.8	131.9	133.1	143.3	139.9	142.8	144.2
30 DAY AVE	131.7	132.2	131.6	133.8	134.8	136.0	138.6
EVAP. AT 300 F	76.2	76.9	77.3	78.8	81.1	80.5	79.3
RECOVERY PCT	97.2	95.8	96.0	95.0	97.3	96.2	95.0
RESIDUE PCT	1.2	1.2	1.7	1.2	1.3	1.3	1.2
RSH (PPM)	1.900	1.200	1.000	0.800	1.000	2.500	1.300
30 DAY AVE	1.354	1.458	1.152	1.060	1.049	1.255	1.295
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD (GR/GAL)	3.59	3.79	3.96	3.10	3.52	2.97	2.93
PCT TML	81.31	80.65	80.39	78.62	79.75	76.58	79.95
KRR BLEND	99.50	99.51	99.50	99.51	99.52	99.40	99.53
30 DAY AVE	99.51	99.51	99.50	99.50	99.50	99.49	99.49
KRM	91.90	91.24	91.12	92.13	91.49	91.59	91.79
ROAD OCTANE BLND	100.17	99.93	99.74	100.24	100.50	100.50	100.85
30 DAY AVE	100.47	100.19	99.98	99.88	99.98	100.08	100.23
OXID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
GUMS.EX.MG/100ML	0.20	0.60	0.40	0.40	0.60	0.60	0.20
SULFUR	0.023	0.022	0.027	0.021	0.026	0.026	0.020

SUPER 76 GASOLINE   SAN FRANCISCO REFINERY   PRODUCTS REPORT

BLEND NUMBER	202	205	214	215	216	222	223
TANK NUMBER	1004	1002	61	1004	242	1004	1004
DATE COMPLETED	9-22-72	9-29-72	10 -9-72	10-11-72	10-12-72	10-18-72	10-23-72
BARRELS BLENDED	69169.	74471.	19768.	34654.	34656.	64283.	64502.
GRADE OF BLEND	W	W	C	W	W	W	W
V/L TEMPERATURE	132.	132.	107.	132.	132.	132.	132.

COMPOSITION (VOL. PCT.)

LUK	0.0	0.0	4.3	25.7	17.9	25.4	25.5
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	14.7	14.6	16.2	43.2	30.2	10.7	23.3
BUTANE	2.1	1.7	13.2	3.0	2.5	0.3	1.5
L.S.T.P.	49.5	50.4	45.6	0.4	30.0	50.1	36.2
C5-C6	25.0	26.9	20.7	27.6	19.4	13.5	13.5
LT. WAXY GASO.	8.6	6.4	0.0	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.0	100.0	99.9	100.0	100.0	100.0

BLEND QUALITY

GRAVITY API	53.7	53.2	57.0	55.2	54.9	56.2	56.1
R.V.P.	9.0	8.4	11.8	8.6	7.2	8.8	8.6
V/L RATIO	5.6	5.4	2.2	5.5	6.4	6.2	6.6
30 DAY AVE	12.7	8.9	5.0	5.1	5.3	5.5	5.7
10 PCT POINT	123.0	121.0	106.0	127.0	127.0	121.0	121.0
MAX DEG.F BLEND	416.0	409.0	418.0	392.0	414.0	424.0	406.0
30 DAY AVE	419.2	416.7	413.0	409.3	410.0	413.0	410.8
W.U.F. BLEND	131.9	133.1	143.3	139.9	142.8	143.0	146.2
30 DAY AVE	132.2	131.6	133.8	134.8	136.0	137.5	140.8
EVAP. AT 300 F	76.9	77.3	78.8	81.1	80.5	77.8	79.3
RECOVERY PCT	95.8	96.0	95.0	97.3	96.2	97.0	97.0
RESIDUE PCT	1.2	1.7	1.2	1.3	1.3	1.4	1.5
RSH PPM	1.200	1.000	0.800	1.000	2.500	1.300	0.600
30 DAY AVE	1.458	1.152	1.060	1.049	1.265	1.273	1.142
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.79	3.96	3.10	3.52	2.97	2.93	2.77
PCT TML	80.65	80.39	78.62	79.75	76.58	79.70	79.78
KRR BLEND	99.51	99.50	99.51	99.52	99.40	99.00	99.01
30 DAY AVE	99.51	99.50	99.50	99.50	99.49	99.38	99.[illegible]7
KRM	91.24	91.12	92.13	91.49	91.59	91.56	91.49
ROAD OCTANE BLND	99.93	99.74	100.24	100.50	100.60	100.59	100.56
30 DAY AVE	100.19	99.98	99.88	99.98	100.08	100.19	100.33
OXID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
GUMS.EX.MG/100ML	0.60	0.40	0.40	0.60	0.60	0.40	0.40
SULFUR	0.022	0.027	0.021	0.026	0.026	0.022	0.017

SUPER 7?? GASOLINE   SAN FRANCISCO REFINERY   PRODUCTS REPORT

BLEND NUMBER	63	69	82	31	83	84	85
TANK NUMBER	243	243	1004	243	1004	243	1004
DATE COMPLETED	3-11-73	3-20-73	3-31-73	4 -1-73	4 -4-73	4 -7-73	4 -9-73
BARRELS BLENDED	29972.	29872.	29382.	29317.	31545.	36801.	53083.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	122.	132.	132.	132.	132.	132.	132.

COMPOSITION (VOL. PCT.)

LUK	30.9	30.3	28.2	30.0	5.1	4.0	4.3
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	42.1	44.5	42.9	44.2	50.0	50.1	49.0
BUTANE	3.0	0.5	5.7	1.1	2.9	1.0	1.5
L.S.T.P.	24.1	24.7	23.2	24.7	10.1	12.0	12.5
C5-C5	0.0	0.0	0.0	0.0	31.9	32.8	32.7
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.1	100.0	100.0	100.0	100.0	99.9	100.0

BLEND QUALITY

GRAVITY API	54.4	53.9	54.9	54.0	56.5	55.0	56.3
R.V.P.	8.6	7.2	8.8	7.5	9.5	7.8	8.0
V/L RATIO	2.2	1.4	11.0	1.1	10.8	1.4	5.2
30 DAY AVE	7.8	8.3	6.8	5.8	5.1	4.4	4.7
10 PCT POINT	127.0	135.0	117.0	136.0	124.0	134.0	125.0
MAX DEG.F BLEND	384.0	388.0	410.0	394.0	370.0	375.0	364.0
30 DAY AVE	386.9	389.5	391.9	391.4	386.3	386.6	381.2
W.U.F. BLEND	136.9	131.5	151.1	131.2	140.7	139.8	152.6
30 DAY AVE	139.0	138.6	139.2	136.9	136.8	138.2	141.6
EVAP. AT 300 F	85.2	84.1	81.1	84.3	83.4	86.3	88.7
RECOVERY PCT	97.0	97.0	97.5	97.0	96.8	97.2	97.1
RESIDUE PCT	1.4	1.4	1.4	1.2	1.2	1.2	1.2
RSH PPM	1.400	1.500	1.000	1.800	0.800	0.300	0.803
30 DAY AVE	1.131	1.095	0.943	1.071	1.184	1.098	1.032
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	1.70	1.78	1.94	1.83	1.96	2.22	2.54
PCT TML	79.74	79.73	72.64	80.35	78.94	79.85	79.72
KRR BLEND	99.01	99.01	99.00	99.02	99.00	99.00	99.01
30 DAY AVE	99.01	99.02	99.00	99.00	99.00	99.00	99.00
KRM	91.79	91.56	91.54	91.51	91.96	91.70	91.73
ROAD OCTANE BLND	100.44	100.49	100.40	100.33	100.51	100.53	100.57
30 DAY AVE	100.43	100.46	100.46	100.44	100.42	100.45	100.47
OXID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
GUMS.EX.MG/100ML	0.40	0.20	0.20	0.30	0.60	0.00	0.40
SULFUR	0.003	0.003	0.021	0.002	0.006	0.001	0.001

REGULAR 73 GASOLINE LOWLW SAN FRANCISCO REFINERY PRODUCTS REPORT

[illegible]ND NUMBER	80	88	87	39	94	97	96
TANK NUMBER	1001	1001	288	1001	287	288	28[illegible]
DATE COMPLETED	3-30-73	4 -4-73	4 -6-73	4 -7-73	4-11-73	4-12-73	4-18-73
BARRELS BLENDED	48664.	19532.	40449.	19370.	47921.	29006.	33675.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.

COMPOSITION (VOL. PCT.)

LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.T.P.	51.3	23.7	46.9	30.8	31.5	49.2	34.2
BUTANE	2.4	2.4	2.0	0.0	0.0	1.5	0.0
LUK	30.5	44.7	30.6	46.1	47.7	30.6	48.[illegible]
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	15.9	29.2	20.6	23.1	20.7	18.8	17.7
L.U.N.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.1	100.0	100.0	100.0	99.9	100.1	100.[illegible]

BLEND QUALITY

GRAVITY API	58.4	59.7	55.5	59.6	59.8	55.3	58.7
R.V.P.	10.4	10.0	7.6	8.9	8.8	7.5	8.6
V/L RATIO	19.0	18.4	1.8	85.8	11.4	2.2	8.5
30 DAY AVE	7.7	7.7	6.8	12.0	13.3	12.2	13.3
10 PCT POINT	113.0	118.0	132.0	121.0	117.0	128.0	120.0
MAX DEG.F BLEND	407.0	392.0	400.0	388.0	392.0	409.0	398.0
30 DAY AVE	405.0	403.7	403.2	402.2	399.5	400.4	398.6
W.U.F. BLEND	153.6	167.9	135.6	167.9	172.3	133.2	162.1
30 DAY AVE	149.7	149.5	147.5	148.8	152.6	150.8	153.0
EVAP. AT 300 F	81.8	86.0	79.9	85.8	85.1	79.1	83.1
RECOVERY PCT	96.2	96.0	97.5	97.0	97.2	96.6	97.0
RESIDUE PCT	1.4	2.0	1.6	1.5	1.2	0.0	1.6
RSH PPM	1.600	0.700	0.800	1.300	0.800	0.600	1.200
30 DAY AVE	0.838	0.838	0.832	0.863	0.966	0.932	1.022
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.4	1.0
LEAD GR/GAL	0.52	0.55	0.52	0.53	0.54	0.53	0.54
30 DAY AVE	0.52	0.52	0.52	0.52	0.53	0.53	0.53
RRB BLEND	93.81	93.56	93.92	93.83	93.80	94.26	93.85
30 DAY AVE	93.98	93.96	93.95	93.94	93.93	93.96	93.97
[illegible] BLEND	86.80	86.59	86.06	86.98	86.86	86.12	86.83
ROAD OCT. BLEND	93.27	93.16	92.70	93.40	93.30	92.75	93.29
30 DAY AVE	93.02	92.97	92.93	92.96	93.01	92.99	93.04
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.40	0.20	0.20	0.20	0.40	0.40
SULFUR	0.003	0.007	0.002	0.002	0.004	0.007	0.002

EXCHANGE SUB - REG. H   SAN FRANCISCO REFINERY   PRODUCTS REPORT

BLEND NUMBER	90	100	113	125	139	149	161
TANK NUMBER	1003	1010	1010	1003	1003	1003	1003
DATE COMPLETED	4-10-73	4-21-73	5 -3-73	5-18-73	6 -9-73	6-18-73	7 -8-73
BARRELS BLENDED	57776.	24048.	23409.	24083.	23860.	74424.	48206.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	140.	140.	140.

COMPOSITION (VOL. PCT.)

L.S.T.P.	48.1	54.3	48.9	42.6	47.1	38.0	39.3
LT. WAXY GASO.	51.9	38.2	46.2	54.2	50.3	60.2	59.9
C5-C6	0.0	6.2	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	1.3	4.9	3.1	2.7	1.9	0.7
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	100.0	99.9	100.1	100.1	99.9

BLEND QUALITY

GRAVITY API	59.8	58.0	57.8	58.9	58.6	60.8	60.5
R.V.P.	8.8	8.1	8.7	8.5	8.7	7.1	8.3
V/L RATIO	9.5	4.7	5.4	7.0	16.0	17.2	18.2
30 DAY AVE	6.8	6.9	7.4	5.7	11.4	16.9	17.3
10 PCT POINT	125.0	129.0	131.0	127.0	134.0	131.0	129.0
MAX DEG.F BLEND	413.0	418.0	423.0	412.0	414.0	408.0	400.0
30 DAY AVE	410.4	411.4	416.3	417.6	412.9	409.4	406.3
W.U.F. BLEND	164.9	149.2	140.8	155.0	151.1	166.8	159.5
30 DAY AVE	162.7	161.7	155.9	148.4	153.0	162.9	161.9
EVAP. AT 300 F	83.5	81.2	80.0	82.5	81.5	84.1	84.9
RECOVERY PCT	97.0	96.0	96.8	96.2	97.8	97.1	97.0
RESIDUE PCT	1.3	1.4	1.2	1.3	1.2	1.4	1.1
RSH PPM	1.500	0.800	1.000	1.000	0.400	0.500	0.600
30 DAY AVE	2.021	1.469	1.228	0.932	0.701	0.475	0.516
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	1.67	1.75	1.76	1.98	1.76	2.36	2.39
KRR BLEND	91.10	91.00	91.11	91.03	91.01	91.00	91.01
30 DAY AVE	91.07	91.05	91.07	91.04	91.02	91.00	91.00
KRM BLEND	86.19	86.15	85.98	86.32	86.05	87.17	86.83
KRR + KRM	177.29	177.15	177.09	177.35	177.06	178.17	177.84
30 DAY AVE	177.11	177.17	177.21	177.19	177.20	177.90	177.82
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.60	0.40	0.40	0.20	0.20	0.40	0.60
SULFUR	0.004	0.001	0.001	0.003	0.001	0.002	0.005

REGULAR 76 GASOLINE UW   SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	56	59	63	68	71A	75	78
TANK NUMBER	1002	1002	1001	1001	1001	1001	1001
DATE COMPLETED	3-21-74	3-24-74	3-31-74	4 -7-74	4-10-74	4-14-74	4-22-74
BARRELS BLENDED	50090.	35586.	65946.	50027.	42074.	29976.	59800.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	20.1	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	0.0	0.0	0.0	0.0	20.1	7.6	1.9
L.S.T.P.	0.0	24.0	18.6	15.1	0.0	0.0	15.8
BUTANE	4.3	3.7	3.1	3.2	4.0	3.3	4.1
LUK	9.0	31.3	31.3	32.0	13.2	30.8	29.2
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	66.6	40.9	47.0	49.7	62.7	58.3	48.9
TOTAL	100.0	99.9	100.0	100.0	100.0	100.0	99.9
BLEND QUALITY							
GRAVITY API	50.7	52.0	53.4	53.9	53.7	54.1	53.4
R.V.P.	9.1	7.2	8.8	8.8	8.7	9.0	8.7
V/L RATIO	7.6	8.0	5.3	6.2	8.2	7.4	6.4
30 DAY AVE	8.3	8.3	7.5	7.3	7.0	6.9	6.6
10 PCT POINT	129.0	126.0	129.0	122.0	129.0	127.0	132.0
MAX DEG.F BLEND	345.0	362.0	369.0	363.0	359.0	361.0	368.0
30 DAY AVE	355.3	356.6	359.8	360.3	360.0	360.1	364.5
W.U.F. BLEND	123.8	127.7	134.5	139.8	137.1	137.8	129.3
30 DAY AVE	127.2	127.3	129.2	130.9	131.6	133.3	134.2
EVAP. AT 300 F	90.5	88.3	86.9	86.2	87.6	87.9	85.0
RECOVERY PCT	96.0	96.0	96.8	97.0	97.0	97.0	97.0
RESIDUE PCT	1.1	1.2	1.1	1.3	1.2	1.0	1.2
RSH PPM	0.600	0.700	2.000	2.000	1.200	1.100	1.400
30 DAY AVE	1.166	1.076	1.318	1.431	1.318	1.353	1.496
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 DAY AVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KRR BLEND	96.19	95.50	95.04	94.91	94.90	94.99	94.92
KRM BLEND	85.36	85.21	85.18	85.13	85.50	85.31	85.47
KRR+KRM/2	90.77	90.35	90.11	90.02	90.20	90.15	90.19
30 DAY AVE	90.50	90.47	90.38	90.32	90.30	90.26	90.13
LEAD OCT. BLEND	91.70	91.56	91.54	91.50	91.78	91.63	91.75
30 DAY AVE	91.65	91.63	91.60	91.59	91.62	91.61	91.62
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.40	0.20	0.40	0.20	0.00	0.00
SULFUR	0.009	0.002	0.000	0.000	0.000	0.000	0.000

EXCHANGE REGULAR — SAN FRANCISCO REFINERY — PRODUCTS REPORT

BLEND NUMBER	120	128	131	143	151	157	163
[redacted]K NUMBER	1003	1006	1003	1006	1003	1006	1003
DATE COMPLETED	6 -6-74	6-16-74	6-23-74	7 -3-74	7-10-74	7-19-74	7-24-74
BARRELS BLENDED	49819.	40253.	53379.	48993.	49050.	48808.	49475.
GRADE OF BLEND							
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
L.S.T.P.	47.3	63.4	70.0	52.3	58.5	58.8	57.7
LT. WAXY GASO.	46.4	33.5	26.4	45.7	39.0	39.0	40.1
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	1.5	3.1	3.6	2.0	2.5	2.2	2.2
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	4.7	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.0	100.0	100.0	100.0	100.0	100.0

BLEND QUALITY

[redacted]VITY API	60.1	58.3	57.4	60.4	58.9	59.3	59.3
R[redacted].P.	7.5	8.9	8.6	8.6	8.9	8.8	8.8
V/L RATIO	19.2	17.6	12.6	17.0	16.4	19.4	18.6
30 DAY AVE	10.8	12.1	12.7	16.4	15.7	16.2	17.8
10 PCT POINT	129.0	133.0	133.0	132.0	128.0	127.0	128.0
MAX DEG.F BLEND	391.0	392.0	394.0	383.0	390.0	406.0	399.0
30 DAY AVE	388.8	387.9	389.1	390.0	389.7	393.2	394.4
W.U.F. BLEND	166.9	148.6	140.4	158.1	152.2	161.6	160.2
30 DAY AVE	165.4	164.9	159.1	153.4	149.6	152.7	158.0
EVAP. AT 300 F	85.8	83.0	82.9	84.8	83.9	83.2	84.0
RECOVERY PCT	97.0	96.8	96.3	96.2	96.3	97.0	96.7
RESIDUE PCT	1.3	1.3	1.2	1.5	1.5	1.3	1.2
RSH PPM	0.400	0.600	0.900	1.600	1.500	1.400	1.300
30 DAY AVE	0.828	0.799	0.789	0.886	1.169	1.340	1.449
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.57	2.31	1.88	2.50	2.09	2.21	2.32
KRR BLEND	93.02	93.01	93.01	93.03	92.97	93.00	93.01
30 DAY AVE	93.01	93.01	93.01	93.01	93.00	93.00	93.00
KRM BLEND	88.65	87.97	87.23	88.69	87.83	87.57	87.60
KRR + KRM	181.67	180.98	180.24	181.72	180.80	180.57	180.61
30 DAY AVE	181.84	181.67	181.30	181.14	180.91	180.81	180.92
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.20	0.40	0.40	0.40	0.40	0.20
SULFUR	0.004	0.003	0.001	0.002	0.003	0.003	0.003

[redacted]

REGULAR 76 GASOLINE UW — SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	105	111	113	119	121	123	124
TANK NUMBER	1001	288	287	1001	288	287	288
DATE COMPLETED	5-21-77	5-26-77	5-30-77	6 -2-77	6 -4-77	6 -7-77	6-10-77
BARRELS BLENDED	79345.	79197.	59542.	39576.	44527.	70717.	69361.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
BUTANE	1.4	2.0	1.9	2.6	3.3	2.8	2.6
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.1	0.0	0.0	0.0
LUK	34.8	37.4	38.4	36.0	38.1	36.5	32.0
REFORMATE (101)	57.4	54.5	55.1	55.4	57.3	55.6	53.8
PLAT (97)	6.5	6.1	4.6	6.0	1.3	5.1	11.6
TOTAL	100.1	100.0	100.0	100.1	100.0	100.0	100.0
BLEND QUALITY							
GRAVITY (API)	52.20	53.00	52.80	52.30	53.30	52.50	51.80
10 PCT POINT	125.00	121.00	125.00	125.00	119.00	128.00	127.00
50 PCT POINT	233.00	227.00	229.00	232.00	223.00	231.00	238.00
90 PCT POINT	339.00	336.00	333.00	335.00	332.00	336.00	339.00
R.V.P.	8.40	8.90	8.50	8.80	8.60	7.40	9.00
30 DAY AVE	8.68	8.70	8.72	8.76	8.75	8.55	8.57
V/L RATIO	14.40	17.70	15.80	13.20	15.60	16.80	14.80
30 DAY AVE	10.18	11.95	12.91	13.41	13.57	14.21	14.28
MAX DEG.F BLEND	415.00	411.00	406.00	408.00	405.00	406.00	413.00
30 DAY AVE	413.83	414.59	414.27	414.38	413.67	412.42	411.93
W.J.N. BLEND	407.90	399.05	401.80	415.00	392.75	406.20	413.80
30 DAY AVE	392.49	389.56	389.04	392.19	392.23	395.92	400.04
RECOVERY PCT	97.00	96.50	97.00	97.00	97.00	96.00	96.00
RESIDUE PCT	1.10	1.30	1.20	1.30	1.30	1.10	1.30
CORR.3HR AT 122F	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MN (GR/GAL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 DAY AVE	0.02	0.02	0.02	0.02	0.02	0.01	0.00
KRR BLEND	95.32	95.28	95.22	95.20	95.50	95.14	95.26
KRM BLEND	85.50	85.49	85.50	85.49	85.50	85.51	85.51
KRR+KRM/2	90.41	90.38	90.36	90.34	90.50	90.32	90.38
30 DAY AVE	90.29	90.24	90.24	90.25	90.27	90.25	90.26
ROAD OCT. BLEND	90.63	90.63	90.63	90.63	90.50	90.63	90.64
30 DAY AVE	90.62	90.62	90.62	90.62	90.61	90.61	90.62
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.00	0.20	0.00	0.20	0.20	0.00	0.20
H (PPM)	1.000	1.300	1.000	1.300	1.800	0.400	0.600
30 DAY AVE	1.116	1.146	1.146	1.134	1.184	1.059	0.971
LEAD	0.000	0.000	0.000	0.001	0.001	0.001	0.000

HP-GAREP
1419 04/19/78

EXCHANGE REGULAR SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	47	59A	71	74	85	93	105
TANK NUMBER	60	61	60	60	61	61	1004
DATE COMPLETED	2-14-78	3 -3-78	3-13-78	3-19-78	3-28-78	4 -6-78	4-15-78
BARRELS BLENDED	40307.	38679.	29591.	25518.	28838.	33892.	52725.
GRADE OF BLEND							
V/L TEMPERATURE	116.	116.	124.	124.	124.	124.	124.

COMPOSITION (VOL. PCT.)

BUTANE	5.9	6.7	.0	.2	2.0	.0	3.5
C5-C6	46.4	4.1	52.2	22.9	.0	19.8	21.7
LT. WAXY GASO.	.0	21.8	.0	.0	26.8	33.4	.0
LUK	.0	.0	.0	.0	.0	.0	.0
REFORMATE	.0	.0	.0	.0	.0	.0	.0
PLAT	47.7	67.3	47.8	76.9	71.3	46.8	74.8
LAR REFORMATE	.0	.0	.0	.0	.0	.0	.0
TOTAL	100.0	99.9	100.0	100.0	100.1	100.0	100.0

BLEND QUALITY

GRAVITY (API)	60.60	55.90	60.20	59.60	54.40	57.60	56.40
10 PCT POINT	113.00	113.00	126.00	115.00	134.00	120.00	131.00
50 PCT POINT	201.00	226.00	207.00	206.00	238.00	210.00	228.00
90 PCT POINT	325.00	339.00	325.00	326.00	338.00	323.00	338.00
MAX DEG.F BLEND	392.00	417.00	401.00	394.00	418.00	394.00	419.00
30 DAY AVE	400.95	401.98	403.36	405.69	408.59	401.63	408.26
R.V.P.	11.60	11.40	9.80	8.30	8.40	7.50	8.90
30 DAY AVE	11.49	11.69	11.04	10.05	9.66	8.47	8.35
V/L RATIO	12.00	9.60	5.40	2.80	2.20	1.10	2.80
30 DAY AVE	9.98	11.53	9.35	6.42	5.43	2.82	2.27
RECOVERY PCT	95.00	95.00	96.00	97.00	96.00	96.50	97.00
LEAD (GR/GAL)	1.45	1.18	2.08	1.87	1.26	1.85	1.34
30 DAY AVE	1.17	1.22	1.53	1.65	1.56	1.77	1.54
KRR BLEND	93.02	93.01	93.01	93.00	93.00	93.00	93.00
30 DAY AVE	93.01	93.01	93.01	93.01	93.01	93.00	93.00
KRM BLEND	88.14	87.18	87.19	87.48	86.80	87.58	87.17
KRR + KRM	181.16	180.19	180.20	180.48	179.80	180.58	180.17
30 DAY AVE	180.44	180.49	180.55	180.27	180.16	180.27	180.25
RESIDUE PCT	1.20	1.20	1.20	1.10	1.20	1.10	1.10
CORR.3HR AT 122F	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GUMS,EX.MG/100ML	.20	.20	.20	.20	.20	.20	.20
RSH (PPM)	.400	.600	.400	.500	.300	.300	.400
30 DAY AVE	.416	.471	.471	.510	.460	.368	.374
SULFUR	.000	.000	.000	.000	.000	.000	.000

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80-87 AVIATION GASOLINE

BLEND NUMBER		9	36	64	80	104	131	157	174	228
TANK NUMBER	SPEC SHEET	348	348	348	348	348	348	348	348	348
SAMPLE NUMBER	MIL-G-5572E	77	420	726	911	1232	1527	1831	2050	2681
DATE BLEND COMPLETED	DATED	1-6-78	1-27-78	2-17-78	3-3-78	03-24-78	04-14-78	05-06-78	05-20-78	7/1/78
BARRELS BLENDED	07/01/72	6.0	6.5	9.0	12.3	7.4	7.9	10.4	11.9	11.0
UNIFINED C5/C6		30.0	27.7	30.7	30.3	14.1	28.2	28.2	32.0	31.8
U110 LITE ALKY		53.3	63.1	52.9	50.8	67.0	53.8	53.4	50.0	49.1
U100 REFORMATE		16.7	9.2	16.4	18.9	18.9	18.0	18.4	18.0	19.1
GRAVITY API 60 F.		64.6	65.5	65.6	65.2	65.2	65.0	65.0	65.4	64.3
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	6.4	6.5	6.8	6.3	6.2	6.5	6.5	6.7	6.9
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.4	0.4	0.2	0.4	0.1	0.2	0.8	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	1.9	2.5	1.1	1.5	0.8	1.0	0.7	2.7	1.0
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.1	0.1	0.1	0.6	0.1	0.1	0.4	0.3	0.1
ANILINE POINT ASTM DEG F		124.2	127.5	126.5	126.2	127.5	125.7	126.0	125.0	120.5
ANILINE GRAVITY CONSTANT	7500 MIN 1*	8023	8351	8298	8228	8313	8171	8190	8175	7748
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER REACTION	2 MAX	1	1	1	1	1	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112
SULFUR WEIGHT PCT	0.05 MAX	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01
TEL ML/GAL CALC	0.50 MAX	0.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KR LEAN D-2700	80.0 MIN	86.2	86.2	86.0	85.7	87.0	87.0	86.2	85.6	84.7
KR RICH	87.0 MIN	94.2	89.5	88.3	87.8	94.1	94.6	93.7	92.6	91.9
MAX DEGREES F	338 MAX	334	329	335	331	333	330	323	334	337
RESIDUE PCT	1.5 MAX	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LOSS PCT	1.5 MAX	1.0	1.5	1.0	1.0	0.0	1.0	1.0	1.5	0.0
10% EVAP DEGREES F	167 MAX	147	146	147	149	159	149	153	150	155
40% EVAP DEGREES F	167 MIN	189	190	188	192	200	194	197	193	190
50% EVAP DEGREES F	221 MAX	200	201	199	203	210	204	206	203	201
90% EVAP DEGREES F	275 MAX	270	265	264	267	267	264	267	265	263
SUM OF 10% & 50% EVAP	307 MIN	347	347	346	352	359	353	359	353	356

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OF GREATER

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGRG, BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

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80-87 AVIATION GASOLINE

BLEND NUMBER			039	120	175	222	279	357	393	425
TANK NUMBER	SPEC SHEET		B 62	62	62	B 348	B 348	62	662	6348
SAMPLE NUMBER	MIL-G-5572E		500	1578	2241	2693	3361	4278	4729	5111
DATE BLEND COMPLETED	DATED		02/05/82	04-21-82	06/03/82	0704	08/14/82	10-17-82	11/20/82	12/18/82
BARRELS BLENDED	8-1-79		10.0	8.9	14.9	12.4	9.9	17.2	10.0	10.0
UNIFINED C5/C6			28.8	25.8	29.1	25.6	27.3	28.3	29.1	25.6
U33 AVIA BASE STOCK			30.4		32.4	32.3	29.3	29.8	31.4	27.8
U110 LITE ALKY			40.8	56.2	38.5	41.9	43.4	41.9	39.5	46.6
U100 REFORMATE			-	18.0						
GRAVITY API 60 F.			66.5	65.8	67.0	67.2	67.2	66.8	67.0	67.4
COLOR SAYBOLT	RED		RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0		6.6	6.7	6.2	6.7	6.3	6.6	6.7	6.8
GUMS AIR JET MG/100 ML	3.0 MAX		0.2	0.2	0.2	0.4	0.2	0.4	0.4	1.0
GUMS POT AIR JET MG/100 ML	6.0 MAX		2.3	1.4	1.4	2.2	2.9	0.8	0.4	5.7
GUMS POT PRECIPT MG/100 ML	2.0 MAX		0.1	1.0	0.8	0.1	0.1	0.1	0.1	0.1
ANILINE POINT ASTM DEG F			136.5	132.0	137.0	138.0	139.3	138.0	136.5	140.5
ANILINE GRAVITY CONSTANT	7500 MIN	1*	9077	8686	9179	9274	9361	9218	9280	9470
WATER REACT INTERFACE RTG	2 MAX		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX		1B	1B	1B	1B	1	1	1B	1B
FREEZING POINT DEGREES F	-76 MAX		<-112	<-118	<-112	<-112	<-112	<-112	<-112	<-112
SULFUR WEIGHT PCT	0.05 MAX		0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01
TEL ML/GAL CALC	0.50 MAX		0.42	0.36	0.41	0.40	.41	0.40	0.42	0.39
KR LEAN D-2700	80.0 MIN		83.6	87.2	82.6	81.7	82.0	83.9	83.0	83.6
KR RICH	87.0 MIN		90.0	92.6	88.6	88.1	88.3	90.2	88.6	89.6
EP DEGREES F	338 MAX		320	334	329	328	316	330	316	332
RESIDUE VOL PCT	1.5 MAX		1.0	1.0	1.5	1.0	1.5	1.0	1.5	1.0
LOSS PCT	1.5 MAX		1.0	1.0	1.5	1.0	1.5	1.0	1.5	1.0
10% EVAP DEGREES F	167 MAX		149	150	150	148	152	150	144	147
40% EVAP DEGREES F	167 MIN		191	196	192	190	192	193	187	191
50% EVAP DEGREES F	221 MAX		202	207	203	202	204	203	199	202
90% EVAP DEGREES F	275 MAX		268	275	272	272	267	271	263	272
SUM OF 10% & 50% EVAP	307 MIN		351	357	353	350	356	353	343	349

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER

DISTRIBUTION - GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

ATTACHMENT M

460 80/87 AVIATION GASOLINE

TANK NUMBER	SPEC SHEET	348	348	348	348	348	348	348	B348	348
SAMPLE NUMBER	MIL-G-5572E	260	1631	2385	4226	4671		7578	7785	8064
DATE BLEND COMPLETED	GS-71 DATED	01-11-75	03-08-75	04-11-75	05-23-75	6-13-75	07-12-75	08-15-75	08-29-75	09-12-75
BARRELS BLENDED	07/01/72	15.9	13.0	14.4	14.9	14.9	14.7	14.8	11.8	14.9
U80 UNIFINED C5/C6			23.0							
U33 AVIA BASE STOCK		59.7	34.9	57.2	51.3	46.6	47.3	36.4	41.8	42.6
U-110 LITE ALKY		37.3	42.1	39.9	25.7	23.7	24.9	28.7	29.1	29.7
BLENDING BUTANE		3.0		2.9						
U120 LT UNICRACKATE					23.0	29.7	27.8	22.4	29.1	27.7
U100 REFORMATE								12.5		
INHIBITOR OXID LB/1000 BBL	8.4 MAX	5.1	5.0	4.9	5.0	5.01	5.1	5.1	5.08	5.0
GRAVITY API 60F		67.8	69.4	68.1	68.1	67.3	66.7	64.1	66.0	67.6
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	MERC	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212F	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID LBS	5.5-7.0	6.2	6.5	6.8	7.0	6.6	6.3	5.9	6.5	6.8
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.6	1.6	0.2	0.6	0.2	0.4	0.4	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	3.0	0.6	2.4	1.2	2.8	2.5	1.6	2.5	2.2
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.1	0.1	0.4	0.6	0.2	0.2	0.0	0.3	0.0
ANILINE POINT ASTM DEG F		140.5	143.0	142.5	137.0	137.3	137.5	126.4	134.5	139.5
ANILINE GRAVITY CONSTANT	7500 MIN 1*	9526	9924	9704	9330	9240	9171	8102	8877	9427
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.5	0.0	0.0	0.0	0.0	1	0.0	0.0
WATER REACTION	2 MAX	1	1	1	1	1	1	1B	1	1
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112
SULFUR WEIGHT PCT	0.05 MAX	0.01	0.01	0.005	0.01-	0.01	0.01-	0.01-	0.01	0.01
TEL ML/GAL CALC	0.50 MAX		0.42	0.38	0.38	0.38	0.42	0.41	0.38	0.38
KR LEAN D-2700	80.0 MIN	82.6	81.4	83.0	81.9	81.6	80.9	82.5	82.3	81.0
KR RICH	87.0 MIN	88.1	87.0	89.0	87.5	87.1	87.3	88.2	88.0	89.6
MAX DEGREES F	338 MAX	295	299	297	284	302	295	310	300	291
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	.5	1.0	1.5	1.0
LOSS PCT	1.5 MAX	1.0	1.5	1.0	1.0	1.5	1.0	1.0	1.5	0.5
10PCT EVAPORATED DEG F	167 MAX	160	153	159	151	150	152	159	148	148
40PCT EVAPORATED DEG F	167 MIN	187	182	192	181	183	187	195	185	184
50PCT EVAP DEGREES F	221 MAX	192	190	199	189	191	196	204	196	194
90 EVAPORATED F	275 MAX	230	231	238	230	238	243	259	245	239
SUM OF 10PCT & 50PCT EVAP	307 MIN	352	345	358	340	341	348	363	344	342

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500
1* OR GREATER

M-3

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER DOD GAR LABORATORY 2

LOS ANGELES REFINERY PRODUCTS REPORT PAGE 2

460 80/87 AVIATION GASOLINE

TANK NUMBER	SPEC SHEET	348	B-348	348	348	348	348	348	348	348
SAMPLE NUMBER	MIL-G-5572E		5484	6618	7011	7289	8572	8830	9356	10230
DATE BLEND COMPLETED	GS-71 DATED	07-13-74	07-27-74	08-09-74	08-30-74	09-13-74	09-27-74	10-11-74	11-09-74	11-29-74
BARRELS BLENDED	07/01/72	14.7	9.8	14.7	15.4	13.8	9.8	9.9	13.2	12.9
U33 AVIA BASE STOCK		57.6	58.3	56.9	56.2	56.1	56.0	57.7	56.9	62.7
U80 REFORMATE										0.5
U-110 LITE ALKY		38.3	37.7	39.0	39.9	40.0	40.0	38.4	37.1	33.9
BLENDING BUTANE		4.1	4.0	4.1	3.9	3.9	4.0	3.9	4.0	2.9
INHIBITOR OXID LB/1000 BBL	8.4 MAX		.005		5.20	.005	5.09	5.0	.005	.005
GRAVITY API 60F		67.0	67.0	66.7	67.4	68.3	68.4	68.1	68.1	67.6
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	NEG	MERC	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212F	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID LBS	5.5-7.0	6.5	6.5	6.4	6.2	6.5	6.4	6.5	6.8	6.4
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.6	0.2	0.2	0.2	0.2	0.2	0.6	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	2.6	3.2	3.5	1.7	0.5	1.5	2.5	1.9	0.7
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.4	0.2	0.1	0.5	0.2	0.1	0.7	0.6	0.1
ANILINE POINT ASTM DEG F		141.4	142.0	138.5	140.3	142.3	141.5	142.0	141.5	138.4
ANILINE GRAVITY CONSTANT	7500 MIN 1*	9474	9514	9238	9456	9719	9679	9670	9636	9356
WATER REACT VOL CHANGE ML	2 MAX	0.0	1	0.0	0.0	0.0	0.0	0.0	0.5	0.5
WATER REACTION	2 MAX	1	1B	1	1	1B	1	1	1B	1B
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	-112
SULFUR WEIGHT PCT	0.05 MAX	0.02	0.02	0.01-	0.01	0.01	0.01-	0.01	0.01-	0.01
TEL ML/GAL CALC	0.50 MAX	0.41	0.42	0.40	0.40	0.42	0.37	0.41		
KR LEAN D-2700	80.0 MIN	81.3	82.3	82.1	80.7	81.4	81.4	82.7	82.9	83.0
KR RICH	87.0 MIN	87.1	87.5	87.7	86.5	87.5	87.5	87.5	88.2	88.3
MAX DEGREES F	338 MAX	292	292	296	295	294	287	294	296	290
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0
LOSS PCT	1.5 MAX	1.5	1.0	0.0	0.0	1.0	1.5	1.5	1.0	1.0
10PCT EVAPORATED DEG F	167 MAX	156	155	161	158	158	161	158	158	159
40PCT EVAPORATED DEG F	167 MIN	192	192	196	190	191	189	190	189	188
50PCT EVAP DEGREES F	221 MAX	197	199	202	197	197	195	196	195	193
90PCT EVAP DEGREES F	275 MAX	234	233	237	236	230	231	234	231	229
SUM OF 10PCT & 50PCT EVAP	307 MIN	353	354	363	355	355	356	354	353	352

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500
1* OR GREATER

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER DOD QAR LABORATORY 2

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100-130 AVIATION GASOLINE

BLEND NUMBER			356	381	392	408	424
TANK NUMBER	SPEC SHEET		349	8349	8349	349	862
SAMPLE NUMBER	G-1		4276	4571	4728	4919	5107
DATE BLEND COMPLETED	DATED 8-1-79		10-16-82	11/08/82	11/20/82	12/03/82	12/17/82
BARRELS BLENDED	MIL-G-5572E		14.7	14.5	9.9	14.9	13.9
UNIFINED C5/C6			12.0	12.2	12.8	12.1	12.1
U110 LITE ALKY			78.9	75.8	73.3	75.6	74.8
BLENDING BUTANE			1.3	1.5	1.6	1.1	1.5
U100 REFORMATE			7.8	10.5	12.3	11.2	11.6
GRAVITY API 60 F.			69.0	68.0	67.3	67.7	67.5
COLOR SAYBOLT	GREEN		GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0		6.6	6.4	6.8	6.7	6.9
GUMS AIR JET MG/100 ML	3.0 MAX		0.4	0.4	0.4	0.4	0.4
GUMS POT AIR JET MG/100 ML	6.0 MAX		0.7	3.0	1.2	1.6	2.6
GUMS POT PRECIPT MG/100 ML	2.0 MAX	1*	0.2	0.4	0.1	0.3	1.8
ANILINE POINT ASTM DEG F			149.8	144.5	140	141.5	142.0
ANILINE GRAVITY CONSTANT	7500 MIN		10336	9826	9422	9580	9585
WATER REACT INTERFACE RTG	2 MAX		0.0	0.0	0.0	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX		1	18	18	18	18
FREEZING POINT DEGREES F	-76 MAX		<-112	<-112	<-112	<-112	<-112
AROMATICS FIA VOLUME PCT	5.0 MIN	2*	4.8	5.6	7.8	7.4	7.3
SULFUR WEIGHT PCT	0.05 MAX		0.01	0.01	<0.01	0.01	0.01
TEL ML/GAL CALC	4.60 MAX	3*	3.86	3.82	3.79	3.80	3.81
KR LEAN D-2700	100.0 MIN		113.9	113.1	110.1	110.5	110.6
KR RICH	130.0 MIN		137.7	134.1	133.8	133.5	130.5
EP DEGREES F	338 MAX		312	322	325	330	336
RESIDUE VOL PCT	1.5 MAX		1.5	1.0	1.0	1.0	1.0
LOSS PCT	1.5 MAX		1.5	1.0	1.0	1.0	1.0
10% EVAP DEGREES F	167 MAX		145	152	152	150	152
40% EVAP DEGREES F	167 MIN		197	201	199	199	201
50% EVAP DEGREES F	221 MAX		206	209	209	206	210
90% EVAP DEGREES F	275 MAX		247	252	259	254	265
SUM OF 10% & 50% EVAP	307 MIN		351	404	361	356	362

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

ATTACHMENT N

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100-130 AVIATION GASOLINE

BLEND NUMBER			204	215	230	241	259	269	278	288	314
TANK NUMBER	SPEC SHEET		B 349	B 62	B 62	B 349	62	349	B 62	B 349	62
SAMPLE NUMBER	G-1		2540	2659	2798	2896	3126	3241	3359	3463	3793
DATE BLEND COMPLETED	DATED 8-1-79		06/23/82	07/01-82	07/09/82	07/17/82	07/30/82	08/07/82	08/13/82	08/20/82	09-10-82
BARRELS BLENDED	MIL-G-5572E		13.9	14.9	16.8	16.1	9.3	13.9	14.7	15.7	14.8
UNIFINED C5/C6			20.3	19.5	19.8	18.8	27.2	17.4	10.4	10.3	10.3
U110 LITE ALKY			71.7	73.8	73.0	73.7	59.8	73.9	79.5	80.1	81.2
BLENDING BUTANE									1.4	1.3	1.6
U100 REFORMATE			8.0	6.7	7.2	7.5	13.0	8.7	8.7	8.3	6.9
GRAVITY API 60 F.			68.6	68.1	69.1	67.3	67.7	66.5	67.6	67.8	69.1
COLOR SAYBOLT	GREEN		GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0		6.8	6.7	6.7	6.6	6.9	6.2	6.5	6.4	6.6
GUMS AIR JET MG/100 ML	3.0 MAX		0.4	0.2	0.4	0.4	0.4	0.2	0.4	0.4	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX		1.5	1.8	2.3	2.4	2.5	2.8	4.0	2.0	1.3
GUMS POT PRECIPT MG/100 ML	2.0 MAX	1*	1.2	0.8	0.1	0.9	0.1	0.4	0.4	1.1	0.3
ANILINE POINT ASTM DEG F			144.5	142.5	146.0	141.5	137.0	139.3	143.6	146.5	149.0
ANILINE GRAVITY CONSTANT	7500 MIN		9913	9704	10089	9523	9275	9263	9707	9933	10296
WATER REACT INTERFACE RTG	2 MAX		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX		18	18	18	18	18	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX		<-112	<-112	<-112	<-112	<-112	<-112	<-112	<-112	<112
AROMATICS FIA VOLUME PCT	5.0 MIN	2*	6.0	8.3	6.3	7.9	10.9	10.3	9.3	6.9	48
SULFUR WEIGHT PCT	0.05 MAX		0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01
TEL ML/GAL CALC	4.60 MAX	3*	3.83	3.62	3.76	3.84	3.86	3.87	3.87	3.86	3.88
KR LEAN D-2700	100.0 MIN		109.9	111.2	113.9	110.71	110.6	110.0	113.9	115.5	113.9
KR RICH	130.0 MIN		131.5	131.1	133.5	131.2	130.2	135.8	136.5	138.4	137.0
EP DEGREES F	338 MAX		329	330	324	320	323	328	328	321	324
RESIDUE VOL PCT	1.5 MAX		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0
LOSS PCT	1.5 MAX		1.0	0.5	1.0	0.0	1.0	0.5	1.5	1.5	1.0
10% EVAP DEGREES F	167 MAX		150	151	150	144	148	157	160	155	153
40% EVAP DEGREES F	167 MIN		197	196	196	194	191	202	205	204	199
50% EVAP DEGREES F	221 MAX		205	205	205	204	203	210	212	210	207
90% EVAP DEGREES F	275 MAX		253	254	253	251	257	261	257	254	251
SUM OF 10% & 50% EVAP	307 MIN		355	356	355	348	351	367	372	365	360

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

461

100-130 AVIATION GASOLINE

BLEND NUMBER			9	038	68	90	114	133	154	179	191
TANK NUMBER	SPEC SHEET		B 349	B 349	B 349	349	349	349	B349	349	349
SAMPLE NUMBER	G-1		97	499	898	1180	1511	1786	1989	2273	2393
DATE BLEND COMPLETED	DATED 8-1-79		01/08/82	02/05/82	03/05/82	03/26/82	04-16-82	05-03-82	05/19/82	06/06/82	06/14/82
BARRELS BLENDED	MIL-G-5572E		14.0	12.5	12.4	13.4	13.9	14.4	13.9	14.9	14.8
UNIFINED C5/C6			19.4	20.6	19.5	18.0	21.0	21.0	20.3	20.9	19.0
U110 LITE ALKY			65.5	64.1	69.1	76.0	68.9	68.5	71.7	70.3	73.5
U100 REFORMATE			15.1	15.3	11.4	6.0	10.1	10.5	8.0	8.8	7.5
GRAVITY API 60 F.			65.6	65.7	64.6	66.3	67.4	67.2	67.4	68.3	68.8
COLOR SAYBOLT	GREEN		GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A	1A	1B	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0		5.9	6.7	62	6.4	6.5	6.4	6.3	6.3	6.7
GUMS AIR JET MG/100 ML	3.0 MAX		0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GUMS POT AIR JET MG/100 ML	6.0 MAX		1.2	2.3	1.9	1.9	2.6	1.3	1.9	2.0	2.5
GUMS POT PRECIPT MG/100 ML	2.0 MAX	1*	0.8	0.1	0.2	0.3	0.1	0.6	0.5	0.3	0.5
ANILINE POINT ASTM DEG F			134.5	134.0	131.2	137.5	139.5	140.3	142.0	144.0	145.0
ANILINE GRAVITY CONSTANT	7500 MIN		8823	8804	8476	9116	9402	9428	9571	9835	9976
WATER REACT INTERFACE RTG	2 MAX		0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX		1B	1B	1B	1B	1B	1A	1B	1	1B
FREEZING POINT DEGREES F	-76 MAX		B-112	<-112	<-112	<-112	<-112	<-112	<-112	B-112	<-112
AROMATICS FIA VOLUME PCT	5.0 MIN	2*	9.6	10.2	12.0	8.7	7.9	8.3	7.1	6.7	6.2
SULFUR WEIGHT PCT	0.05 MAX		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TEL ML/GAL CALC	4.60 MAX	3*	3.90	3.84	3.82	3.42	3.83	3.80	3.79	3.51	3.84
KR LEAN D-2700	100.0 MIN		110.7	107.7	106.4	109.9	110.7	112.3	109.6	110.2	112.3
KR RICH	130.0 MIN		137.1	133.5	132.8	133.9	137.2	132.5	130.4	131.6	131.8
EP DEGREES F	338 MAX		338	338	338	336	336	338	327	330	326
RESIDUE VOL PCT	1.5 MAX		1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0
LOSS PCT	1.5 MAX		1.0	0.5	0.5	1.5	1.5	1.0	1.0	1.5	1.5
10% EVAP DEGREES F	167 MAX		161	155	156	152	153	153	145	153	152
40% EVAP DEGREES F	167 MIN		205	202	200	202	202	199	194	197	199
50% EVAP DEGREES F	221 MAX		213	211	210	212	211	208	201	207	208
90% EVAP DEGREES F	275 MAX		269	271	274	271	272	267	252	260	255
SUM OF 10% & 50% EVAP	307 MIN		374	366	366	364	364	363	346	360	360

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGRG, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

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100-130 AVIATION GASOLINE

BLEND NUMBER		007	043	077	118	147	175	202	220	247
TANK NUMBER	SPEC SHEET	349	349	349	349	349	349	349	349	349
SAMPLE NUMBER	G-1	109	574	1055	1657	1995	2310	2630	2855	3143
DATE BLEND COMPLETED	DATED 1-15-76	01-06-79	02-03-79	03-03-79	04-06-79	04-28-79	05-18-79	06-08-79	06-25-79	07-13-79
BARRELS BLENDED	MIL-G-5572E	14.7	12.0	16.0	15.8	14.9	15.8	16	15.5	10.8
TTL BBLS IN TANK AFT BLEND	GS-71							15.7		
UNIFINED C5/C6		25.3	28.6	23.9	14.0	24.3	25.0	23.8	22.2	10.3
U110 LITE ALKY		54.8	54.6	56.0	68.1	56.8	57.7	57.1	68.9	79.8
BLENDING BUTANE					1.3			1.1		
U100 REFORMATE		19.9	16.8	20.1	16.6	18.9	17.3	18.0	15.9	9.9
GRAVITY API 60 F.		63.7	63.9	63.5	65.3	64.5	65.1	64.9	6.5	66.8
COLOR SAYBOLT	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX	1B	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	6.2	6.3	6.5	6.6	6.3	6.2	6.8	6.5	6.2
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	1.9	1.4	1.8	0.4	1.8	1.2	0.5	3.1	1.6
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.4	0.6	0.3	1.2	0.6	0.5	0.2	0.1	0.2
ANILINE POINT ASTM DEG F		121.2	123.5	122.5	131.2	136.5	128.5	129.0	133.0	139.7
ANILINE GRAVITY CONSTANT	7500 MIN 1*	7720	7892	7779	8567	8804	8365	8372	8712	9332
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.0	0.0	18	0.0	0	0.0	0.0	0.0
WATER REACTION	2 MAX	1	1	18	0.5	1	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	<-112	B-112	B-112	-112	<-112	B-112
AROMATICS FIA VOLUME PCT	5.0 MIN 2*	15.6	13.3	14.1	11.1	11.4	12.5	11.4	10.2	8.0
SULFUR WEIGHT PCT	0.05 MAX	<0.01	0.01	0.01	0.00	<0.01	<0.01	0.01	0.01	<0.01
TEL ML/GAL CALC	4.60 MAX 3*	3.61	3.55	3.61	3.56	3.65	3.40	3.60	3.72	3.93
KR LEAN D-2700	100.0 MIN	104.5	104.5	103.5	107.2	105.3	104.5	104.0	105.1	109.6
KR RICH	130.0 MIN	132.2	130.2	131.2	131.8	131.0	130.4	130.8	130.4	133.5
MAX DEGREES F	338 MAX	334	336	336	338	334	336	332	326	338
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.5
LOSS PCT	1.5 MAX	0.5	0.0	0.5	1.0	0	1.5	1.5	1.0	1.5
10% EVAP DEGREES F	167 MAX	149	153	151	157	155	152	144	151	150
40% EVAP DEGREES F	167 MIN	192	194	196	201	197	198	195	197	198
50% EVAP DEGREES F	221 MAX	203	206	206	210	208	208	206	207	207
90% EVAP DEGREES F	275 MAX	270	271	270	271	274	273	269	269	267
SUM OF 10% & 50% EVAP	307 MIN	352	359	357	367	363	360	350	358	357

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OF GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

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Manual on Significance of Tests for Petroleum Products: 5th Edition

GEORGE V. DYROFF
editor

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Aviation Fuels

INTRODUCTION

IT IS DIFFICULT TO DISCUSS AVIATION FUELS without reviewing the development history of the various types of aviation fuels and describing quality requirements in terms of official specifications produced by the cooperative efforts of engine manufacturers, airline operators, fuel suppliers, and appropriate government departments. These documents define the required fuel properties and specify the standard test methods to be used. The international validity of these specifications and rigid enforcement ensures that fuels of uniform quality are available on a worldwide basis for all types of aircraft engines.

It is not feasible to include full details of all major international specifications in this chapter. Even summaries of the main requirements would be of little permanent value, since these specifications are revised and updated frequently to meet new aircraft needs or reflect changing supply situations. However, the basic content of the various specifications covering similar grades of fuel do not differ greatly, and, with few exceptions, the same fuel properties are controlled in each. Typical examples of the physical and chemical property requirements contained in current specifications are included for each of the main aviation gasoline and jet fuel grades.

HISTORICAL DEVELOPMENT OF AVIATION FUELS

Aviation gasolines for spark-ignition engines reached their development peak in the 1939 to 1945 war years. The advent of the gas turbine inhibited further piston engine development, and, although large quantities of aviation gasoline will be required for many years, quality requirements are unlikely to change significantly.

The first aviation gas-turbine engines were regarded as having noncritical fuel requirements. Since ordinary illuminating kerosine was the original development fuel, the first turbine fuel specifications were written largely around the properties and test methods associated with this well-established product. With increased complexity in design of the engine and its control, fuel specification tests have become inevitably more complicated and numerous. Current demands for improved performance, economy, and overhaul life will indirectly continue the trend towards additional tests; nevertheless, the optimum compromise between fuel quality and availability is achieved largely by the current fuel specifications.

AVIATION GASOLINE

Composition and Manufacture

Aviation gasoline is the most complex fuel produced in a refinery. Strict process control is required to ensure that the stringent (and sometimes conflicting) specifications are met for volatility, calorific value, and antiknock ratings. In addition, careful handling is required during storage and distribution to guard against various forms of contamination which can affect such properties as volatility, gum values, and the copper strip corrosion test.

Aviation gasoline consists substantially of hydrocarbons. Sulfur-containing and oxygen-containing impurities are limited strictly by specification and only certain additives are permitted (refer to the section on Aviation Fuel Additives).

The main component of high-grade avi-

ation gasolines is *iso*octane produced in the alkylation process by reaction of refinery butenes with isobutane over acid catalysts. To meet volatility requirements for the final blend, a small proportion of isopentane (obtained by superfractionation of light straight-run gasoline) is added. The aromatic component required to improve rich mixture rating is usually a catalytic reformate. The amount of aromatic components added is limited indirectly by the gravimetric calorific value requirement.

Only grade 80 fuel can include a proportion of straight-run gasoline because straight-run gasolines, which contain varying amounts of paraffins, naphthenes, and aromatics invariably lack the necessary branch-chain paraffins (isoparaffins) required to produce the higher grade fuels.

Specifications

Content

Aviation fuel specifications generally contain three main sections covering suitability, composition, and chemical and physical requirements.

The suitability section is included as a safeguard against the possible failure in service of a fuel which meets all the published physical and chemical tests in the specification. It throws the onus on the fuel producer to obey the spirit as well as the letter of the law. This philosophy is inherent in all aviation fuel specifications.

The composition section stipulates that the fuel must consist entirely of hydrocarbons except for trace amounts of approved additives, such as alkyl lead antiknock additive, dyes, and oxidation inhibitors. Its main importance is in listing the approved additives and, indirectly, in excluding any nonhydrocarbon blending components such as oxygenates, which might be used to improve a critical property of the fuel at the ultimate expense of other fuel properties.

The chemical and physical requirements section is the one most familiar to users since it carefully defines the allowable limits for many chemical and physical properties of the fuel and the standard test methods to be employed.

Fuel Grades

About six basic fuel grades have been in use since the 1939 to 1945 war period. In recent years, the diminishing demand for aviation gasoline has led to a reduction in the number of grades available. With fewer fuel grades, manufacturing, storage, and handling costs were reduced with subsequent benefits to consumers. At present, three grades—80, 100, and 100 lowlead—are specified in ASTM Specification for Aviation Gasolines (D 910).

Specifications covering the various grades have been drawn up by a number of bodies, and these have been revised as engine requirements changed. The most commonly quoted aviation gasoline specifications are those issued by the U.S. Department of Defense (military specifications), the British Ministry of Defense (DERD[1] specifications), and the American Society for Testing and Materials (ASTM D 910). Table 1 lists the main aviation gasoline specifications in current use and indicates the various grades together with their identifying dye colors.

Due to the international nature of aviation activities, the technical requirements of all the Western specifications are virtually identical, and only differences of a minor nature exist between the specifications issued in the various major countries. The Soviet GOST specifications (and their East European equivalents) differ in the grades covered and also in respect to some of the limits applied, but, in general, the same fuel properties are controlled, and most test methods basically are similar to their Western equivalents [American Society for Testing and Materials (ASTM) and Institute of Petroleum (IP) standards]. Soviet aviation gasoline grades are summarized in Table 2.

Table 3 provides detailed requirements for aviation gasoline as contained in ASTM Specification for Aviation Gasolines (D 910). In general, the main technical requirements of all other Western specifica-

[1]In current issues of the British Military Specifications, the traditional term "D.Eng.R.D." has been abbreviated to "DERD" (Directorate of Engine Research and Development). For uniformity, this new abbreviation is used throughout this chapter, even for obsolete specifications.

iation gasolines—main international specification grades.

Identifying Color	Nominal Antiknock Characteristics, Lean/Rich	NATO Code Number	Current Specifications: DERD 2485 British Ministry of Defense	Current Specifications: MIL-G-5572 U.S. Department of Defense[b]	Current Specifications: ASTM D 910	Use
Colorless	73	F-13[a]	...	...	...	blending component
Colorless	80	...	...	...	...	blending, historic
Red	80/87	F-12	80	80/87	80	minor civil
Blue	91/96	F-15[a]		obsolete		
Blue	100/130	F-18	100LL	100/130	100LL	major civil
Green	100/130	...	100	...	100	minor military
Brown	108/135			obsolete		
Purple	115/145	F-22	115	115/145	...	military—virtually obsolete

[a]Obsolete designation.
[b]Specification MIL-G-5572 was withdrawn in 1988.

TABLE 2. Soviet aviation gasoline grades.

Specification	Grade	Color	Use
...	B.70	colorless	obsolete
GOST-1012	B.91/115[a]	green	current
GOST-1012	B.95/130[a]	yellow	current
...	B.100/130	bright orange	obsolete
GOST-5760	BA(115/160)	varies	obsolete

[a]In regular and premium qualities.

tions are virtually identical to those in Table 3, although differences occur in the number of grades covered and, in some cases, the amount of tetraethyl lead (TEL) permitted. The various grades within the specification differ fundamentally in only a few vital respects, such as color, antiknock ratings, and TEL content. This is true of all the Western aviation gasoline specifications. The two remaining grades in the Soviet GOST specification are subdivided, somewhat curiously, into ordinary and premium qualities with differing limits for aromatics, olefins, sulfur, and acidity.

The limits specified for Western grades of aviation gasoline were, in most cases, dictated originally by military aircraft engine requirements. Since then, the performance requirements for civil and military aircraft engines have changed very little. However, improved fuel manufacturing techniques and the reduced demand for certain grades has allowed fuel suppliers to produce modified fuel grades more suited to market requirements. In some cases, the objective has been to offer a technically superior fuel; in other cases, the aim has been the reduction of production, storage, and handling costs by providing a fuel suitable for use in a wider range of engine types than was possible with the standard grades.

Characteristics and Requirements

Antiknock Properties

The various fuel grades are classified by their "antiknock" quality characteristics as determined in single-cylinder laboratory engines. Knock, or detonation, in an engine is a form of abnormal combustion where the air/fuel charge in the cylinder ignites spontaneously in a localized area instead of being consumed progressively by the spark-initiated flame front. Knocking combustion can damage the engine and give serious power loss if allowed to persist. The various grades are designed to guarantee knock-free operation for a range of engines from those used in light aircraft up to high-powered transport and military types.

TABLE 3. Detailed requirements for aviation gasolines.[a]

	Grade 80	Grade 100	Grade 100LL
Knock value, lean rating:			
Minimum octane number	80	100	100
Knock value, rich rating:			
Minimum octane number	87	. . .	. . .
Minimum performance number	. . .	130	130
Color	Red	Green	Blue
Dye content:			
Permissible blue dye, max, mg/U.S. gal	0.5	4.7	5.7
Permissible yellow dye, mg/U.S. gal	None	5.9	None
Permissible red dye, max, mg/U.S. gal	8.65	None	None
Tetraethyl lead, max, mL/U.S. gal	0.5	4.0	2.0
gPb/L	0.14	1.12	0.56

	Requirements for All Grades
Distillation temperature, °C (°F):	
10% evaporated, max temp	75(167)
40% evaporated, min temp	75(167)
50% evaporated, max temp	105(221)
90% evaporated, max temp	135(275)
Final boiling point, max, °C (°F)	170(338)
Sum of 10 and 50% evaporated temperatures, min, °C (°F)	135(307)
Distillation recovery, min, %	97
Distillation residue, max, %	1.5
Distillation loss, max, %	1.5
Net heat of combustion, min, Btu/lb (MJ/kg)	18720 (43.54)
Vapor pressure:	
min, kPa(psi)	38(5.5)
max, kPa(psi)	49(7.0)
Copper strip corrosion, max	No. 1
Potential gum (5-h aging gum), max, mg/100 mL	6
Visible lead precipitate, max, mg/100 mL	3
Sulfur, max %m	0.05
Freezing point, max, °C(°F)	−58(−72)
Water reaction	Volume change not to exceed ±2 mL
Permissible antioxidants, max, lb/1000 bbl (42 gal)	4.2

[a]ASTM Specification for Aviation Gasolines (D 910-85).

The antiknock ratings of aviation gasolines are determined in standard ASTM laboratory engines by matching their performance against reference blends of pure *iso*octane (2,2,4-trimethyl pentane) and n-heptane. Fuel rating is expressed as an octane number (ON) which is defined as the percentage of *iso*octane in the matching reference blend. Fuels of higher performance than pure *iso*octane (100 ON) are tested against blends of *iso*octane with various amounts of antiknock additive. The rating of such fuel is expressed as a performance number (PN) which is defined as the maximum knock-free power output obtained from the fuel expressed as a percentage of the power obtainable on *iso*octane.

The antiknock rating of fuel varies according to the air/fuel mixture strength employed. This fact is used in defining the performance requirements of the higher grade aviation fuels. As mixture strength is increased (richened), the additional fuel acts as an internal coolant and suppresses knocking combustion which, in turn, permits a higher power rating to be obtained. Since maximum power output is the prime requirement of an engine under rich take-off conditions, the "rich mixture performance" of a fuel is determined in a special supercharged single-cylinder engine using ASTM Test for Knock Characteristics of Aviation Fuels by the Supercharge Method (D 909/IP 119). Similarly, economic cruising operation of an engine is obtainable with weak (lean) mixture strengths. "Weak mixture performance" is determined by

ASTM Test for Knock Characteristics of Motor and Aviation Fuels by the Motor Method (D 2700/IP 236).

Until 1975, ASTM Specification for Aviation Gasolines (D 910) designated aviation gasoline grades with two numbers, for example, "grade 100/130." The lower number denoted an antiknock of 100 minimum by the lean mixture test procedure, and the higher number 130 minimum by the rich mixture procedure. Although the ASTM specification now uses only one number to designate grade (the number from the lean mixture procedure) some other specifications still use both.

Volatility

All internal combustion engine fuels must be easily convertible from storage in the liquid form to the vapor phase in the engine to allow formation of the combustible air/fuel vapor mixture. If gasoline fuel volatility is too low, liquid fuel enters the cylinders and washes lubricating oil from the walls and pistons. This would increase engine wear and cause dilution of the crankcase oil. Poor volatility can also give rise to critical maldistribution of mixture strength between cylinders. If volatility is too high, fuel can vaporize in the fuel tank and supply lines giving undue venting losses and the possibility of fuel starvation through "vapor lock" in the fuel lines. The cooling effect due to rapid vaporization of excessive amounts of highly volatile material also can cause ice formation in the carburetor under certain conditions of humidity and air temperature. Many modern aircraft have anti-icing devices on the engines including the provision of carburetor heating.

Distillation characteristics are determined with a procedure (ASTM D 86/IP 123) in which a sample of the fuel is distilled and the vapor temperature recorded for the percentages of evaporation or distillation throughout the range. Distillation points are selected to control volatility in the following ways:

1. The percent evaporated at 75°C (167°F) controls front-end volatility. Not less than 10%, but not more than 40% of the fuel must evaporate at that temperature. The minimum value ensures that volatility is adequate for normal cold starting. The maximum value controls vapor lock, fuel system vent losses, and carburetor icing.

2. The requirement that at least 50% of the fuel be evaporated at 105°C (221°F) ensures that the fuel has even distillation properties and does not consist of low-boiling and high-boiling components only. This provides control over the rate of engine warm-up and stabilization of slow-running conditions.

3. The requirement that the sum of the 10 and 50 percent evaporated temperatures exceed 135°C (307°F) also controls the overall volatility and indirectly places a lower limit on the 50 percent point. The clause is an additional safeguard against excessive fuel volatility.

4. The requirement that a minimum of 90% of the fuel be evaporated at 135°C (275°F) controls the proportion of less volatile fuel components and, therefore, the amount of unvaporized fuel passing through the engine manifold into the cylinders. The limit represents a compromise between ideal fuel distribution characteristics and commercial considerations of fuel availability which could be affected adversely by further restriction of this limit.

5. The final distillation temperature of 170°C (338°F) maximum excludes any undesirable heavy material which could cause fuel maldistribution and also dilution of the crankcase oil.

All spark-ignition engine fuels have a vapor pressure which is a measure of the tendency of the more volatile fuel components to escape from the fuel tank in the form of vapor. When an aircraft climbs rapidly to a high altitude, the atmospheric pressure over the fuel is reduced and may become less than the vapor pressure of the fuel at its prevailing temperature. If this occurs, the fuel will "boil," and considerable quantities of the more volatile components will escape as vapor through the tank vents.

Vapor pressure for aviation gasolines is controlled and determined by the ASTM Test for Vapor Pressure of Petroleum Products (Reid Method) (D 323/IP 69). Limits are between 38 and 49kPa (5.5 to 7.0 psi). The lower limit is an additional check on adequate volatility for engine starting. The up-

per limit controls excessive vapor formation during high-altitude flight and "weathering" losses in storage.

Density and Heat of Combustion

No great variation in either density or heat of combustion occurs in modern aviation gasolines since they depend on hydrocarbon composition which is already closely controlled by other specification properties. Both factors have relatively greater importance with jet fuels as discussed in detail later.

Freezing Point

Maximum freezing point values are set for all types of aviation fuel as a guide to the lowest temperature at which the fuel can be used without risk of separation of solidified hydrocarbons. Such separation could lead to fuel starvation through clogging of fuel lines or filters or loss in available fuel load due to retention of solidified fuel in the tanks. The low freezing point requirement also virtually precludes the presence of benzene which, while a high octane material, has a very high freezing point.

The standard freezing-point test involves cooling the fuel until a slurry of crystals form throughout the fuel and noting the temperature at which all crystals disappear on rewarming the fuel. Freezing points are determined by ASTM Test for Freezing Point of Aviation Fuels (D 2386/IP 16).

Storage Stability

Aviation fuel must retain its required properties for long periods of storage in all kinds of climates. Unstable fuels oxidize and form polymeric oxidation products which remain as a resinous solid or "gum" on induction manifolds, carburetors, valves, etc. as the gasoline is evaporated. Formation of this undesirable gum must be limited strictly, and it is assessed by the existent and accelerated (or potential) gum tests.

The existent gum value is the amount of gum actually present in the fuel at the time of the test. It is determined by ASTM Test for Existent Gum in Fuels by Jet Evaporation (D 381/IP 131). The accelerated gum test, ASTM Test for Oxidation Stability of Aviation Fuels (Potential Residue Method) (D 873/IP 138), predicts the possibility of gum forming during protracted storage and decomposition and precipitation of the antiknock additive.

To ensure that the strict limits of the stability specification clauses are met, aviation gasoline components are given special refining treatments to remove the trace impurities responsible for instability. In addition, limited quantities of approved oxidation inhibitors are added. Currently, little trouble is experienced with gum formation or degradation of antiknock additive.

Sulfur Content

Total sulfur content of aviation gasoline is limited to 0.05 percent mass maximum because most sulfur compounds have a deleterious effect on the antiknock efficiency of alkyl lead compounds. If sulfur content were not limited, specified antiknock values would not be reached for highly leaded grades of aviation fuel. Sulfur content is estimated by ASTM Test for Sulfur in Petroleum Products (Lamp Method) (D 1266/IP 107) or X-Ray Spectrographic Method (D 2622).

Some sulfur compounds can have a corroding action on the various metals of the engine system. Effects vary according to the chemical type of sulfur compound present. Fuel corrosivity is assessed by its action on a copper strip used in ASTM Test for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (D 130/IP 154).

Water Reaction

The original intent of the water reaction test was to prevent the addition of high octane and water soluble components such as alcohol to aviation gasoline. The test methods involved shaking 80 mL of fuel with 20 mL of water under standard conditions and observing phase volume changes and interface condition. Many specifications for aviation gasoline now have phase separation requirements in addition to those for volume change and interface condition. Water Reaction of Aviation Fuels (D 1094/IP 289) rates all three of these criteria.

Automotive (Motor) Gasoline—Use In Aircraft

In general and at the date of this printing, reciprocating aviation engines and the fuel systems in aircraft so powered are designed to operate on one of the grades of fuel specified in ASTM Specification for Aviation Gasolines (D 910), or equivalent. Most major aviation piston engine manufacturers specifically exclude motor gasoline from their list of approved fuels. Many fuel manufacturers also disapprove of the use of motor gasolines in any aircraft. The suitability of motor gasoline for use in aircraft is limited for both technical and safety reasons which are explained below.

Motor gasoline can vary in both composition and quality from supplier to supplier, from country to country, and, in temperate climates, from season to season; in comparison to aviation gasoline, motor gasoline is not a closely or uniformly specified product. A particular variable in recent years is the increasing inclusion of strong detergent additives and of alcohols and/or other oxygenates in motor gasoline.

Availability and cost considerations have encouraged many owners of light aircraft to seek acceptance of motor gasoline as an alternative to aviation gasoline. In recognition of this trend and in order to maintain regulation and control of motor gasoline use, various civil aviation regulatory agencies around the world have extended supplemental or special certification provisions to permit the use of motor gasoline in a limited number of specified aircraft types which are considered, because of design features, to be less sensitive to fuel properties. In the United States of America, such supplemental type certificates (STCs) specify motor gasoline meeting the requirements of ASTM Specification for Automotive Gasoline (D 439). However, the responsibility for any consequences arising from the adoption of alternative fuels such as motor gasoline rests with the owner/operator of the aircraft, the parties who have sought and received approval, and the regulatory agencies that granted said approvals.

The compositional and property differences between motor gasoline and aviation gasoline are detailed below in relation to their potential adverse effects on engine/aircraft operation and flight safety. These factors should be reviewed and evaluated before use of motor gasoline in aircraft.

1. Motor gasolines have a wider distillation range than aviation fuels. This could promote poor distribution of the high antiknock components of the fuel in some carbureted engines. Further, the octane ratings of motor gasoline and aviation gasoline are not comparable due to the different test methods used to rate the two types of fuels. Preignition and detonation conditions could develop due to the appreciable difference in actual antiknock performance of motor and aviation fuels of apparent similar octane ratings.

2. Higher volatility and vapor pressures of motor gasolines could overtax the vapor handling capabilities of certain engine/airframe combinations and could lead to vapor lock or carburetor icing. Fire hazards could also be increased.

3. Motor gasoline has a shorter storage stability lifetime than aviation gasoline and can form gum deposits which can induce poor mixture distribution and other engine mechanical side effects such as valve sticking.

4. Due to higher aromatics content and the possible presence of oxygenates, motor gasoline could have solvent characteristics which are unsuitable for some aircraft engine/airframe combinations. Seals, gaskets, flexible fuel lines, and some fuel tank materials could be affected.

5. Motor gasoline may contain additives which could prove incompatible with certain in-service engine or airframe components. The concentration of additives such as detergents is being continually revised to meet the requirements of advanced automotive fuel injection systems. Alcohols or other oxygenates could increase the tendency for the fuel to hold water, either in solution or in suspension. Other additives, not considered here, could also lead to problems not specifically addressed in this document.

6. The testing and quality protection measures applied to automotive gasoline are much less stringent than for aviation fuels. There is a greater possibility of contamination occurring and less possibility of it being detected. Because motor

gasolines meet less stringent requirements, compositional extremes still meeting D 439 might cause undefined difficulties in certain aircraft. Furthermore, D 439 is being continually revised.

7. The antiknock compounds used in leaded motor gasolines contain an excess of chlorine and bromine-containing lead scavengers, whereas aviation gasolines contain a lesser concentration of bromine compounds only. Chlorine compounds give more corrosive combustion products. In addition, lead phasedown regulations in some countries may result in motor gasoline containing insufficient lead to prevent excessive valve seat wear in certain engines.

The above factors illustrate that use of motor gasoline in aircraft may involve certain risks that the potential user must assess.

AVIATION TURBINE FUELS (JET FUELS)

Background

Aircraft gas-turbine engines require a fuel with quite different properties from those for aviation gasoline. Probably the greatest difference is that antiknock value is of no importance and is replaced by the need for a heating fuel of good combustion characteristics and high-energy content. Illuminating kerosine was chosen as the fuel for the first generation of engines largely because of its ready availability, low-fire hazard, good combustion properties, and, not least, the war-time need to conserve gasoline supplies. As engine and fuel system designs have become more complicated, so have the fuel specifications become more varied and restrictive.

Jet fuel quality worldwide is dictated on the commercial side largely by the British Ministry of Defence (DERD) specifications and those of the airlines, engine manufacturers, and industry groups such as ASTM and the International Air Transport Associations (IATA). At airports around the world, jet fuel for airlines is delivered frequently from jointly operated systems in which fuel from a number of suppliers is comingled. This practice has led to the development of a Joint Fueling Systems Check List, which embraces the most critical requirements of the major specifications.

Military jet fuel is dictated largely by the U.S. Department of Defense (U.S. MIL) specifications and corresponding DERD specifications. Grades of commercial and military fuels are virtually identical in basic properties and differ mainly in the types of additives permitted. The only significant exception is in the case of the fuel types used in the Soviet Union and most East European countries. These grades are based on USSR state standards (GOST specifications) and differ in several major respects from their nearest "Western" equivalents.

In the People's Republic of China, early grades of aviation turbine fuel were also based on USSR Standards, but, for recently introduced grades, Western standards and test methods are being adopted.

Only two basic types of jet fuel are in general use worldwide: the kerosine type and the wide-cut gasoline type. The former is a modified development of the illuminating kerosine originally used in gas-turbine engines. The latter is a wider boiling-range material which includes some gasoline fractions, developed in the United States of America primarily for military use, to improve on availability from crude oil. In addition, a number of specialized fuel grades are required for limited military use either as referee fuels or, more particularly, in special high-performance military aircraft.

Composition and Manufacture

Aviation turbine fuels are manufactured predominantly from straight-run kerosines, or kerosine/naphtha blends in the case of wide-cut fuel, from the atmospheric distillation of crude oil. Straight run kerosine from some sweet crudes will meet all the requirements of the jet fuel specification without further refinery processing, but for the majority of crudes, the kerosine fraction will contain trace constituents which have to be removed before the kerosine is merchantable as jet fuel. This is normally effected by hydrotreating (hydrofining) or by a chemical sweetening process (for example, Merox). For further detail on

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Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup et al.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
1	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,571,439	6	5		polymer gas
2	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,579,990	4	40		polymer gas
3	2.6	.	.	0.0	72.6	27.4	*	100	.	.	.	.	.	98.5		US5,041,208	11	64	Pt-USDY	cat gas
4	3.0	231	326	3.5	43.0	53.5		100	.	.	.	.	.	89.7		US4,437,436	9	50	B	
5	3.6	.	.	0.0	47.5	52.5	*	100	.	.	.	.	.	94.1		US5,041,208	11	30	HDT	cat gas
6	3.6	.	.	0.0	50.3	49.7	*	100	.	.	.	.	.	94.5		US5,041,208	11	30	Pt-USDY	cat gas
7	3.8	284	368	.	.	.		.	.	.	.	.	.	86.5		US4,818,250	8	63	20/80	
8	4.1	177	207	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	A	2 comp T10=159
9	5.0	200	316	2.3	34.0	63.7		100	30.0	.	.	.	.	86.8		SAE 801352	11	App A-1	R-30	
10	5.1	258	378	6.1	24.8	69.1		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	9R	T10=184
11	5.2	247	.	22.8	30.5	46.6		100	.	.	.	.	.	84.8		US5,041,208	10	41	full	cat gas
12	5.2	234	312	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	4	
13	5.2	230	330	0.3	24.9	74.8	*	100	.	.	.	.	.	84.5		CRC 510	18	II,I	1	
14	5.2	216	227	.	.	.		.	10.0	.	.	.	.	101.0		US4,812,146	6	18	9	>57% arom
15	5.2	213	304	18.0	29.5	52.5	*	100	.	.	.	.	.	86.1		CRC 477	17	II,I	2	
16	5.2	.	.	22.8	30.5	46.7	*	100	.	.	.	.	.	84.8		US5,041,208	12	42	Joliet	cat gas
17	5.3	235	307	12.1	28.4	59.5	*	100	.	.	.	.	.	95.6		BM 7291	4,40	1	4	
18	5.3	207	308	19.0	27.5	53.5	*	100	.	.	.	.	.	91.5		CRC 477	17	II,I	13	
19	5.3	186	314	18.1	23.2	58.7		100	30.0	.	.	.	.	86.6		SAE 801352	11	App A-1	F-30	
20	5.4	231	323	15.0	37.5	47.5		100	.	.	.	.	.	86.3		SAE 770811	7	A-1	F-11	
21	5.4	205	302	18.0	28.5	53.5	*	100	.	.	.	.	.	88.8		CRC 477	17	II,I	6	
22	5.4	205	301	5.4	23.5	71.1	*	100	.	.	.	.	.	83.7		CRC 494	20	II,I	1	
23	5.4	201	338	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	B	
24	5.5	256	361	35.5	28.5	36.0		100	.	.	.	.	.	86.3		SAE 770811	8	A-1	F-18	
25	5.5	235	335	.	.	.		.	.	.	.	.	.	91.9		CRC 541	15	III,II	15	
26	5.5	223	330	20.5	36.0	43.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-6	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

ATTACHMENT P

Fuels Survey
Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
27	5.6	243	340	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	D	
28	5.7	253	328	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-10	
29	5.7	235	335	.	.	.		.	.	.	.	.	.	87.9		US4,444,567	3	57	FT-266	Burns T10=164
30	5.7	218	294	0.6	22.3	77.1	*	100	.	.	.	.	.	90.9		CM-79-71	16	II,I	9	
31	5.7	216	325	1.5	40.4	58.1		100	15.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-15	
32	5.7	216	229	.	.	.		.	10.0	.	.	.	.	100.7		US4,812,146	4	14	1	>52% arom
33	5.7	215	303	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-10	
34	5.8	236	317	1.5	22.8	75.7	*	100	.	.	.	.	.	86.4		CM-79-71	16	II,I	1	
35	5.8	225	330	18.1	17.5	64.4	*	100	.	.	.	.	.	85.6		CRC 510	18	II,I	2	
36	5.8	224	322	2.1	43.4	54.5		100	5.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-5	
37	5.9	235	343	.	.	.		.	.	.	.	.	.	.		AP213,136	9		b	
38	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		CRC 520	19	III,I	16	
39	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		SAE 821211	3	1,2	16	
40	6.0	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	169	Fig 5	6A	
41	6.0	223	332	2.0	19.5	78.5	*	100	.	.	.	.	.	87.9		CRC 477	17	II,I	12	
42	6.0	223	330	2.0	19.5	78.5	*	100	.	.	.	.	.	85.6		CRC 477	17	II,I	5	
43	6.0	222	334	22.7	13.4	63.9	*	100	.	.	.	.	.	84.3		CM-79-71	16	II,I	2	
44	6.0	220	330	2.0	20.0	78.0	*	100	.	.	.	.	.	82.4		CRC 477	17	II,I	1	
45	6.0	217	328	11.5	39.0	49.5		100	.	.	.	.	.	87.6		SAE 770811	7	A-1	F-14	
46	6.0	216	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	6	>52% arom
47	6.0	198	303	.	.	.		.	.	.	.	.	.	.	P	SAE 780651	4	2	low	
48	6.1	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	BL	
49	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		CRC 520	19	III,I	10	
50	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		SAE 821211	3	1,2	10	
51	6.1	220	325	1.5	41.3	57.2		100	10.0	.	.	.	.	86.3		SAE 801352	11	App A-1	R-10	
52	6.1	220	312	0.3	23.4	76.3	*	100	.	.	.	.	.	89.2		CRC 510	18	II,I	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
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Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
53	6.1	212	326	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XE	
54	6.1	170	208	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	B	2 comp
55	6.2	254	370	.	.	.		.	.	.	.	.	.	.		SAE 750419		App 1	A	
56	6.2	226	331	1.6	44.6	53.8		100	.	.	.	.	.	86.4		SAE 801352	11	App A-1	R-0	
57	6.2	216	228	.	.	.		.	8.0	.	.	.	.	100.5		US4,812,146	4	39	5	>52% arom
58	6.2	215	314	8.5	32.0	59.5	*	100	.	.	.	.	.	88.5		CRC 477	17	II,I	11	
59	6.2	212	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	1	
60	6.3	251	336	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	28	
61	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		CRC 520	19	III,I	3	
62	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		SAE 821211	3	1,2	3	
63	6.3	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	166	4	6A	
64	6.3	224	346	22.5	26.7	50.8	*	100	.	.	.	.	.	88.0		CM-79-71	16	II,I	12	
65	6.3	217	229	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	5	41	9	>57% arom
66	6.3	210	352	.	.	.		.	.	.	.	.	.	.		AP213,136	11		a	
67	6.3	195	333	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	AL	
68	6.3	194	300	1.6	27.0	71.4	*	100	.	.	.	.	.	87.2		CRC 494	20	II,I	6	
69	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		CRC 520	19	III,I	9	
70	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		SAE 821211	3	1,2	9	
71	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		CRC 520	19	III,I	13	
72	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		SAE 821211	3	1,2	13	
73	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		CRC 520	19	III,I	12	
74	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		SAE 821211	3	1,2	12	
75	6.4	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	7	
76	6.4	218	327	1.0	40.5	58.5		100	.	.	.	.	.	84.4		SAE 770811	7	A-1	F-3	
77	6.4	206	300	6.0	42.0	52.0	*	100	.	.	.	.	.	92.5		CRC 477	17	II,I	14	
78	6.4	203	315	17.5	30.9	51.6	*	100	.	.	.	.	.	85.1		CM-79-71	16	II,I	8	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
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Fuels Survey

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RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
79	6.4	197	295	15.7	25.3	59.0		100	.	.	.	.	.	86.8		SAE 730474	1444	1	A	
80	6.4	195	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	5	
81	6.5	257	339	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	B1	
82	6.5	217	228	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	4	39	2	>56% arom
83	6.5	215	328	12.0	37.5	50.5		100	.	.	.	.	.	86.5		SAE 770811	7	A-1	F-9	
84	6.5	199	336	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	2	
85	6.5	.	.	.	.	.		.	.	.	.	.	.	.		US3,886,759	5	35		
86	6.6	260	335	7.0	53.0	40.0		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-16	
87	6.6	252	366	.	.	.		.	.	.	.	.	.	87.0		US4,818,250	8	63	10/90	
88	6.6	245	318	1.0	27.3	71.7	*	100	.	.	.	.	.	87.9		CM-79-71	16	II,I	6	
89	6.6	243	344	.	31.6	.	*	.	.	.	.	.	.	91.3		HES 35-32030	11	9	6.5	Avg of 3
90	6.6	234	335	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	I	
91	6.6	232	318	4.0	28.3	67.7	*	100	.	.	.	.	.	89.1		CRC 445	17	II	2	
92	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		CRC 451	19	III	I-2	
93	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		SAE 710675	2	2	2	
94	6.6	232	315	4.0	26.0	70.0	*	100	.	.	.	.	.	90.9		CRC 451	19	III	T (b)	
95	6.6	231	338	.	.	.		.	4.5	.	.	.	.	90.9		CRC 541	15	III,II	24	
96	6.6	226	359	4.3	21.7	74.0		100	.	.	.	.	.	87.6		API 4310	8	I	I	
97	6.6	225	338	.	.	.		.	9.6	.	.	.	.	92.0		CRC 541	15	III,II	25	
98	6.6	183	360	15.0	16.1	68.9		100	.	.	.	.	.	74.4		CRC 454	22	II	AU-8-79	
99	6.6	.	.	4.5	40.2	55.3		100	.	.	.	.	.	90.8		SAE 900153	2	1	ES2	T50>215
100	6.7	241	343	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	4	
101	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		CRC 520	19	III,I	8	
102	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		SAE 821211	3	1,2	8	
103	6.7	232	336	19.7	40.5	39.8	*	100	.	.	.	.	.	87.5		SAE 780612	175	2	3	
104	6.7	220	330	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
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RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
105	6.7	220	317	9.9	24.3	65.8	*	100	.	.	.	.	.	87.3		CM-79-71	16	II,I	13	
106	6.7	213	302	3.8	14.2	82.0	*	100	.	.	.	.	.	86.7		CRC 510	18	II,I	5	
107	6.7	210	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	6	
108	6.7	210	302	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-20	
109	6.7	.	.	11.3	49.4	39.3	*	100	.	.	.	.	.	91.8		US5,041,208	12	42	Net prod	cat gas
110	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		CRC 520	19	III,I	5	
111	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		SAE 821211	3	1,2	5	
112	6.8	232	325	15.0	40.5	44.5		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-17	
113	6.8	228	338	.	.	.		.	.	.	.	.	8.7	90.9		CRC 541	15	III,II	23	
114	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		CRC 520	19	III,I	15	
115	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		SAE 821211	3	1,2	15	
116	6.8	217	341	2.9	26.7	70.4		100	.	.	.	.	.	91.7		API 4310	8	I	II	
117	6.8	217	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	4	>52% arom
118	6.8	216	326	10.9	24.7	64.4	*	100	.	.	.	.	.	88.8		CRC 510	18	II,I	13	
119	6.8	208	335	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	A1	
120	6.8	198	305	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	III	
121	6.8	195	286	32.2	9.0	58.8		100	.	.	.	.	.	74.4		CRC 454	23	III	AU-10-79	
122	6.8	191	325	.	.	.		.	.	.	23.5	.	.	92.9		SAE 902132	2	2	F	
123	6.8	191	319	.	.	.		.	.	.	.	.	.	.		SAE 730593	2107	App A-1	V-4	
124	6.8	185	331	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	12	
125	6.8	181	328	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	7	
126	6.8	180	283	.	.	.		.	.	.	.	.	.	.	P	SAE 841386	8	App A	2	
127	6.9	246	329	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-20	
128	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 519	D-6	D-V	331	
129	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 525	C-4	C-IV	331-80	
130	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 519	D-5	D-V	328	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
131	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 525	C-1	C-I	328-80	
132	6.9	234	336	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	14	
133	6.9	232	337	.	.	.		.	.	.	.	4.7	.	90.8		CRC 541	15	III,II	20	
134	6.9	232	337	.	.	.		.	.	.	.	.	4.5	90.5		CRC 541	15	III,II	22	
135	6.9	228	335	.	.	.		.	.	.	.	.	.	86.7		CRC 541	15	III,II	2	
136	6.9	227	345	21.7	33.1	45.2	*	100	.	.	.	.	.	85.7		CM-79-71	16	II,I	16	
137	6.9	226	335	.	.	.		.	.	.	.	9.3	.	91.7		CRC 541	15	III,II	21	
138	6.9	224	304	1.0	34.0	65.0	*	100	.	.	.	.	.	89.7		CRC 451	19	III	S	
139	6.9	216	301	5.7	33.3	61.0	*	100	.	.	.	.	.	86.2		CM-79-71	16	II,I	3	
140	6.9	214	337	3.4	35.4	61.2		100	.	.	.	.	.	86.9		SAE 780949	13	App B-3	8R	
141	6.9	.	.	18.8	31.4	49.8		100	.	.	.	.	.	90.9		SAE 900153	2	1	ES3	T50>215
142	7.0	237	341	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	14	
143	7.0	234	294	11.6	27.5	60.9	*	100	.	.	.	.	.	90.2		CRC 494	20	II,I	8	
144	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		CRC 520	19	III,I	7	
145	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		SAE 821211	3	1,2	7	
146	7.0	232	327	13.9	26.1	60.0	*	100	.	.	.	.	.	93.4		CRC 510	18	II,I	12	
147	7.0	231	327	1.5	29.7	68.8	*	100	.	.	.	.	.	91.1		CRC 510	18	II,I	11	
148	7.0	229	.	.	.	.		.	.	.	.	.	.	.	P	SAE 710136	9	2	V	
149	7.0	226	312	4.7	32.0	63.3		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	11R	
150	7.0	226	311	1.0	21.8	77.2	*	100	.	.	.	.	.	89.3		CRC 494	20	II,I	9	
151	7.0	226	253	5.1	70.9	24.0		100	.	.	.	.	.	95.9		CRC 515	D-6	D-V	325	
152	7.0	224	367	35.1	18.6	46.3		100	.	.	.	.	.	79.9		CRC 451	103	D-XI	242-71	
153	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		CRC 520	19	III,I	1	
154	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		SAE 821211	3	1,2	1	
155	7.0	221	319	3.0	16.5	80.5	*	100	.	.	.	.	.	91.5		CRC 494	20	II,I	10	
156	7.0	216	314	11.6	14.5	73.9	*	100	.	.	.	.	.	92.1		CRC 510	18	II,I	10	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
157	7.0	215	314	24.3	15.9	59.8	*	100	.	.	.	.	.	91.3		CRC 510	18	II,I	7	
158	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,313,738	2	62	FT-116	.28 wt% S
159	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,322,304	3	60	FT-116	.28 wt% S
160	7.0	214	323	.	.	.		.	.	.	.	.	.	.		SAE 892090	4	5	first	
161	7.0	212	309	9.7	22.8	67.5	*	100	.	.	.	.	.	88.3		CRC 494	20	II,I	13	
162	7.0	211	328	21.0	32.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-4	
163	7.0	210	310	7.5	31.5	61.0	*	100	.	.	.	.	.	88.4		CRC 477	17	II,I	8	
164	7.0	208	340	14.0	20.0	66.0		100	.	.	.	.	.	74.9		CRC 493	114	D-V	286	
165	7.0	208	317	10.5	28.5	61.0	*	100	.	.	.	.	.	90.8		CRC 477	17	II,I	15	
166	7.0	205	319	17.9	28.3	53.8	*	100	.	.	.	.	.	83.4		CM-79-71	16	II,I	4	
167	7.0	204	321	21.0	30.5	48.5		100	.	.	.	.	.	86.1		SAE 770811	7	A-1	F-12	
168	7.0	204	291	12.6	8.3	79.1	*	100	.	.	.	.	.	87.8		CM-79-71	16	II,I	14	
169	7.0	195	299	9.8	16.0	74.2		100	.	.	.	.	.	86.8		CRC 454	22	II	AU-8-91	
170	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 467	96	D-IV	261	
171	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 476	48	D-IV	261	
172	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		CRC 445	86	D-IX	239-71	
173	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.5		CRC 451	103	D-XI	239-71	
174	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		SAE 710675	15	A-3	239-71	
175	7.0	192	325	22.0	25.8	52.2		100	15.0	.	.	.	.	85.9		SAE 801352	11	App A-1	F-15	
176	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		CRC 520	19	III,I	2	
177	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		SAE 821211	3	1,2	2	
178	7.1	225	303	9.2	28.8	62.0	*	100	.	.	.	.	.	87.7		CM-79-71	16	II,I	24	
179	7.1	220	308	1.7	33.0	65.3	*	100	.	.	.	.	.	89.3		CM-79-71	16	II,I	11	
180	7.1	220	229	.	.	.		.	0.0	.	.	.	.	100.5		US4,812,146	5	12	8	>60% arom
181	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 467	96	D-IV	265	
182	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 476	48	D-IV	265	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey
Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
183	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		SAE 750937	6	6	265	
184	7.1	214	301	11.4	16.6	72.0	*	100	.	.	.	.	.	89.2		CM-79-71	16	II,I	10	
185	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 570	C-1	C-1	368-89/90	
186	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 575	C-1	C-1	368-89/90	
187	7.1	207	303	35.1	17.7	47.2	*	100	.	.	.	.	.	85.4		CM-79-71	16	II,I	7	
188	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 570	C-3	C-3	372-89/90	
189	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 575	C-3	C-3	372-89/90	
190	7.1	203	314	7.5	41.5	51.0	*	100	.	.	.	.	.	88.7		CRC 477	17	II,I	7	
191	7.1	203	307	0.5	19.0	80.5		100	.	.	.	.	.	86.0		SAE 770811	7	A-1	F-1	
192	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 519	D-5	D-V	327	
193	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 525	C-1	C-I	327-80	
194	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 467	96	D-IV	263	
195	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 476	48	D-IV	263	
196	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		SAE 750937	6	6	263	
197	7.2	244	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	3	
198	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		CRC 520	19	III,I	18	
199	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		SAE 821211	3	1,2	18	
200	7.2	236	336	2.1	41.9	56.0		100	.	.	.	.	.	89.1		US4,437,436	9	50	C	
201	7.2	232	334	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-3	
202	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 544	C-1	C-I	351-84	
203	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 548	C-1	C-I	351-84	
204	7.2	224	304	6.0	29.0	65.0	*	100	.	.	.	.	.	87.3		CRC 451	19	III	T	
205	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		CRC 445	86	D-IX	242-71PB	
206	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		SAE 710675	15	A-3	242-71PB	
207	7.2	214	309	13.5	30.0	56.5		100	.	.	.	.	.	86.1		CRC 454	23	III	AU-10-91	
208	7.2	213	353	15.0	9.3	75.6		100	.	.	.	.	.	87.7		US4,294,587	2	42	FT-175	Burns

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
209	7.2	208	345	20.0	22.0	58.0		100	.	.	.	.	.	74.3		CRC 493	114	D-V	289	
210	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		SAE 750763	2	2	Clr Comm	
211	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		BERC/RI-76	7	2	Clr Comm	
212	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 497	143	D-V	292	
213	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 500	76	D-IV	292	
214	7.2	203	283	11.7	8.3	80.0		100	.	.	.	.	.	88.1		CRC 451	103	D-XI	240-71	
215	7.2	202	314	7.0	42.5	50.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	3	
216	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 467	96	D-IV	260	
217	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 476	48	D-IV	260	
218	7.2	197	311	0.0	47.0	53.0		100	.	.	.	.	.	96.2		CRC 493	114	D-V	288	
219	7.2	195	345	15.0	17.0	68.0		100	.	.	.	.	.	74.0		CRC 479	85	D-V	269	
220	7.2	195	220	7.0	28.0	65.0		100	.	.	.	.	.	89.3		SAE 730474	1444	1	C	
221	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 561	C-1	C-I	362-87/88	
222	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 566	D-7	D-III	362	
223	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 567	6	1	362-87/88	
224	7.3	235	330	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-5	
225	7.3	231	327	12.0	41.5	46.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-7	
226	7.3	230	333	3.2	29.1	67.7	*	100	.	.	.	.	.	88.8		CM-79-71	16	II,I	22	
227	7.3	230	329	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XF	
228	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 445	86	D-IX	243-71	
229	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 451	103	D-XI	243-71	
230	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		SAE 710675	15	A-3	243-71	
231	7.3	219	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	2	
232	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 523	D-3	D-III	335	
233	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 525	C-4	C-IV	335-81	
234	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 533	C-4	C-IV	335-81	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole- fins	% Arom- atics	% Satu- rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
235	7.3	217	229	.	.	.		.	7.0	.	.	.	.	100.3		US4,812,146	4	39	7	>53% arom
236	7.3	212	314	11.0	31.0	58.0	*	100	.	.	.	.	.	88.2		CRC 477	17	II,I	10	
237	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 561	C-3	C-III	365-87/88	
238	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 566	D-7	D-III	365	
239	7.3	201	310	10.9	23.3	65.8	*	100	.	.	.	.	.	88.3		SAE 740520	3	2	10	
240	7.3	197	327	21.0	28.0	51.0		100	.	.	.	.	.	84.5		SAE 770811	7	A-1	F-6	
241	7.3	195	306	17.0	17.0	66.0		100	.	.	.	.	.	80.6		CRC 479	85	D-V	272	
242	7.3	187	325	28.0	21.5	50.5		100	15.0	.	.	.	.	86.2		SAE 801352	11	App A-1	F-15′	
243	7.3	.	.	.	.	.		.	.	.	.	.	.	90.4		US4,899,014	11	37	FG	cat gas
244	7.3	.	.	.	.	.		.	.	.	.	.	.	90.3		US4,899,014	11	37	FG+	cat gas
245	7.4	230	289	2.3	58.9	38.8		100	.	.	.	.	.	96.5		CRC 515	D-5	D-V	322	
246	7.4	225	296	5.0	49.0	47.0		101	.	.	.	.	.	96.2		CRC 493	114	D-V	291	
247	7.4	217	230	.	.	.		.	7.0	.	.	.	.	100.2		US4,812,146	4	39	3	>50% arom
248	7.4	216	313	9.5	30.0	60.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	4	
249	7.4	213	330	11.0	26.5	62.5		100	.	.	.	.	.	88.6		SAE 770811	7	A-1	F-13	
250	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 544	C-4	C-IV	353-84	
251	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 548	C-3	C-III	353-84	
252	7.4	205	318	11.0	20.0	69.0		100	.	.	.	.	.	86.3		CRC 493	114	D-V	287	
253	7.4	204	339	15.0	20.0	65.0		100	.	.	.	.	.	76.6		CRC 488	97	D-V	280	
254	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		CRC 445	86	D-IX	240-71PB	
255	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		SAE 710675	15	A-3	240-71PB	
256	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	A	
257	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	B	
258	7.4	202	286	5.0	53.0	42.0		100	.	.	.	.	.	96.3		CRC 488	97	D-V	282	
259	7.4	.	.	.	.	.		.	.	.	.	.	.	89.8		US4,873,389	10	18	1	cat gas
260	7.4	.	.	.	.	.		.	.	.	.	.	.	90.0		US4,873,389	10	18	2	cat gas

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey 20:10 Tuesday, October 18, 1994

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
261	7.5	240	339	6.2	28.9	64.9		100	.	.	.	.	.	90.3		SAE 780949	12	App B-2	11P	
262	7.5	237	335	6.9	24.5	68.6	*	100	.	.	.	.	.	92.5		CRC 494	20	II,I	12	
263	7.5	234	339	.	.	.		.	.	4.3	.	.	.	91.1		CRC 541	15	III,II	18	
264	7.5	232	327	.	.	.		.	.	.	.	.	.	90.6		CM-125-78	139	C-8	ET-2 base	
265	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 570	C-3	C-3	373-89/90	
266	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 575	C-3	C-3	373-89/90	
267	7.5	230	337	.	.	.		.	.	8.4	.	.	.	91.9		CRC 541	15	III,II	19	
268	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 548	C-3	C-III	360-85/86	
269	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 553	C-3	C-III	360-85/86	
270	7.5	228	367	.	.	.		.	.	.	.	.	.	85.7		CRC 541	15	III,II	27	
271	7.5	220	292	0.1	30.5	69.4	*	100	.	.	.	.	.	87.1		CRC 510	18	II,I	6	
272	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		CRC 445	86	D-IX	241-71PB	(6)
273	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		SAE 710675	15	A-3	241-71PB	
274	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 467	96	D-IV	262	
275	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 476	48	D-IV	262	
276	7.5	218	289	12.5	23.7	63.8		100	.	.	.	.	.	94.5		CRC 451	103	D-XI	244-71	
277	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 570	C-1	C-1	370-89/90	
278	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 575	C-1	C-1	370-89/90	
279	7.5	216	363	10.1	24.0	62.9		97	4.9	.	.	.	.	87.7		SAE 902129	5	1	EC-1	10/90 (7)
280	7.5	216	282	6.9	32.4	60.7		100	.	.	.	.	.	94.8		SAE 730474	1444	1	B	
281	7.5	215	350	32.5	25.0	42.5	*	100	.	.	.	.	.	88.0		CRC 510	18	II,I	4	
282	7.5	214	344	.	.	.		.	9.7	.	.	.	.	87.9		CRC 541	15	III,II	12	
283	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		CRC 445	86	D-IX	244-71PB	
284	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		SAE 710675	15	A-3	244-71PB	
285	7.5	210	325	15.0	19.0	66.0		100	.	.	.	.	.	77.6		CRC 488	97	D-V	277	
286	7.5	209	320	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XC	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
287	7.5	208	255	0.0	7.0	76.0		83	10.4	.	.	.	.	86.7		RFG Clean Air		X	9	7/90 (8)
288	7.5	204	335	.	.	.		.	.	.	12.7	.	.	90.7		SAE 902132	2	2	D	
289	7.5	200	327	8.6	22.7	68.7	*	100	.	.	.	.	.	86.3		CM-79-71	16	II,I	19	
290	7.5	197	317	5.4	19.0	75.6		100	.	.	.	.	.	75.8		CRC 515	D-5	D-V	320	
291	7.5	196	304	0.0	19.0	60.0		79	11.3	.	.	.	.	86.8		RFG Clean Air		X	8	7/90 (8)
292	7.5	185	331	0.4	30.6	69.0	*	100	.	.	.	.	.	87.3		SAE 750451	8	I	2	
293	7.5	.	.	.	.	.		.	.	.	.	.	.	.		GMR-6589	23	4	Minimum	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

EXTRA COPY OF APPENDIX L FOR BOARD'S USE

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
271	<7.5	≤158	<203	<300	<8	>65		≥87	No	-11.32	-31.18	-1.11	-7.29	-12.51
272	<7.5	≤158	<200	<300	<8	>65		≥87	No	-11.77	-31.34	-0.97	-7.56	-12.73
273	<7.5	≤158	<198	<300	<8	>65		≥87	No	-12.05	-31.43	-0.88	-7.74	-12.87
274	<7.5	≤158	<195	<300	<8	>65		≥87	No	-12.43	-31.56	-0.74	-8.00	-13.08
275	<7.5	≤158	<193	<300	<8	>65		≥87	No	-12.63	-31.63	-0.66	-8.16	-13.21
276/271	<7.5	≤158	<203	<300	<6	>68		≥87	No	-10.97	-31.07	-1.78	-8.55	-13.52
276/272	<7.5	≤158	<200	<300	<6	>68		≥87	No	-11.42	-31.22	-1.64	-8.81	-13.73
276/273	<7.5	≤158	<198	<300	<6	>68		≥87	No	-11.70	-31.32	-1.55	-8.98	-13.86
276/274	<7.5	≤158	<195	<300	<6	>68		≥87	No	-12.08	-31.45	-1.41	-9.23	-14.07
276/275	<7.5	≤158	<193	<300	<6	>68		≥87	No	-12.29	-31.52	-1.33	-9.38	-14.19
277/276/271	<7.0	≤158	<203	<300	<6	>68		≥87	No	-12.55	-40.81	-2.02	-8.66	-16.30
277/276/272	<7.0	≤158	<200	<300	<6	>68		≥87	No	-13.00	-40.97	-1.88	-8.92	-16.50
277/276/273	<7.0	≤158	<198	<300	<6	>68		≥87	No	-13.27	-41.06	-1.79	-9.09	-16.64
277/276/274	<7.0	≤158	<195	<300	<6	>68		≥87	No	-13.65	-41.19	-1.65	-9.34	-16.84
277/276/275	<7.0	≤158	<193	<300	<6	>68		≥87	No	-13.85	-41.26	-1.57	-9.49	-16.96
278/.../272	<7.0	<140	<200	<300	<6	>68		≥87	No	-13.00	-40.97	-1.88	-8.92	-16.50
278/.../273	<7.0	<140	<198	<300	<6	>68		≥87	No	-13.27	-41.06	-1.79	-9.09	-16.64
278/.../274	<7.0	<140	<195	<300	<6	>68		≥87	No	-13.65	-41.19	-1.65	-9.34	-16.84
278/.../275	<7.0	<140	<193	<300	<6	>68		≥87	No	-13.85	-41.26	-1.57	-9.49	-16.96

Patent App: 08/409,074 filed 3/22/95 for Jessup et al.

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
278/277/276 /271	<7.0	<140	<203	<300	<6	>68		≥87	No	-12.55	-40.81	-2.02	-8.66	-16.30
279/271	<7.5	<140	<203	<300	<6	>70		≥87	No	-11.29	-31.17	-2.27	-10.50	-15.08
279/272	<7.5	<140	<200	<300	<6	>70		≥87	No	-11.74	-31.33	-2.14	-10.75	-15.29
279/273	<7.5	<140	<198	<300	<6	>70		≥87	No	-12.02	-31.42	-2.05	-10.92	-15.42
279/274	<7.5	<140	<195	<300	<6	>70		≥87	No	-12.40	-31.55	-1.91	-11.17	-15.62
279/275	<7.5	<140	<193	<300	<6	>70		≥87	No	-12.60	-31.62	-1.83	-11.31	-15.73
280/279/271	<7.0	<140	<203	<300	<6	>70		≥87	No	-12.87	-40.92	-2.51	-10.61	-17.86
280/279/272	<7.0	<140	<200	<300	<6	>70		≥87	No	-13.31	-41.07	-2.38	-10.87	-18.06
280/279/273	<7.0	<140	<198	<300	<6	>70		≥87	No	-13.58	-41.16	-2.29	-11.03	-18.20
280/279/274	<7.0	<140	<195	<300	<6	>70		≥87	No	-13.96	-41.29	-2.15	-11.28	-18.39
280/279/275	<7.0	<140	<193	<300	<6	>70		≥87	No	-14.16	-41.36	-2.07	-11.42	-18.51
281	<7.5	≤158	<208	≤315	<8	>72	≥4.5	≥87	No	-11.57	-31.27	-3.28	-13.52	-17.51
282/281	<7.5	≤158	≤205	≤315	<8	>72	≥4.5	≥87	No	-11.93	-31.39	-3.19	-13.69	-17.64
283/281	<7.5	≤158	<200	≤315	<8	>72	≥4.5	≥87	No	-12.83	-31.70	-2.93	-14.18	-18.03
284/281	<7.5	≤158	<198	≤315	<8	>72	≥4.5	≥87	No	-13.11	-31.80	-2.84	-14.35	-18.17
285/281	<7.5	≤158	<195	≤315	<8	>72	≥4.5	≥87	No	-13.48	-31.92	-2.71	-14.59	-18.36
286/281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥87	No	-13.69	-31.99	-2.63	-14.74	-18.48
287/282/281	<7.5	<140	≤205	≤315	<8	>72	≥4.5	≥87	No	-11.93	-31.39	-3.19	-13.69	-17.64
287/283/281	<7.5	<140	<200	≤315	<8	>72	≥4.5	≥87	No	-12.83	-31.70	-2.93	-14.18	-18.03

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
287/284/281	<7.5	<140	<198	≤315	<8	>72	≥4.5	≥87	No	-13.11	-31.80	-2.84	-14.35	-18.17
287/286/281	<7.5	<140	<193	≤315	<8	>72	≥4.5	≥87	No	-13.69	-31.99	-2.63	-14.74	-18.48
288/281	<7.5	≤158	<208	≤315	<6	>72	≥4.5	≥87	No	-10.55	-30.92	-3.06	-12.04	-16.32
288/282/281	<7.5	≤158	≤205	≤315	<6	>72	≥4.5	≥87	No	-10.91	-31.04	-2.97	-12.22	-16.46
288/283/281	<7.5	≤158	<200	≤315	<6	>72	≥4.5	≥87	No	-11.82	-31.36	-2.71	-12.70	-16.85
288/284/281	<7.5	≤158	<198	≤315	<6	>72	≥4.5	≥87	No	-12.10	-31.45	-2.62	-12.87	-16.98
288/286/281	<7.5	≤158	<193	≤315	<6	>72	≥4.5	≥87	No	-12.69	-31.65	-2.40	-13.26	-17.29
289/.../283 /281	<7.0	≤158	<200	≤315	<6	>72	≥4.5	≥87	No	-13.39	-41.10	-2.95	-12.82	-19.63
289/288/281	<7.0	≤158	<208	≤315	<6	>72	≥4.5	≥87	No	-12.14	-40.67	-3.30	-12.16	-19.10
289/288/282 /281	<7.0	≤158	≤205	≤315	<6	>72	≥4.5	≥87	No	-12.49	-40.79	-3.21	-12.33	-19.24
289/288/284 /281	<7.0	≤158	<198	≤315	<6	>72	≥4.5	≥87	No	-13.66	-41.19	-2.86	-12.98	-19.76
289/288/286 /281	<7.0	≤158	<193	≤315	<6	>72	≥4.5	≥87	No	-14.24	-41.39	-2.64	-13.37	-20.07
290/288/281	<7.5	<140	<208	≤315	<6	>72	≥4.5	≥87	No	-10.55	-30.92	-3.06	-12.04	-16.32
290/288/282 /281	<7.5	<140	≤205	≤315	<6	>72	≥4.5	≥87	No	-10.91	-31.04	-2.97	-12.22	-16.46
290/288/283 /281	<7.5	<140	<200	≤315	<6	>72	≥4.5	≥87	No	-11.82	-31.36	-2.71	-12.70	-16.85
290/288/284 /281	<7.5	<140	<198	≤315	<6	>72	≥4.5	≥87	No	-12.10	-31.45	-2.62	-12.87	-16.98

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
290/288/286 /281	<7.5	<140	<193	≤315	<6	>72	≥4.5	≥87	No	-12.69	-31.65	-2.40	-13.26	-17.29
291/288/281	<7.5	≤158	<208	<300	<6	>72	≥4.5	≥87	No	-10.81	-31.01	-3.07	-11.95	-16.25
291/288/282 /281	<7.5	≤158	≤205	<300	<6	>72	≥4.5	≥87	No	-11.17	-31.13	-2.98	-12.12	-16.39
291/288/283 /281	<7.5	≤158	<200	<300	<6	>72	≥4.5	≥87	No	-12.08	-31.45	-2.72	-12.60	-16.77
291/288/284 /281	<7.5	≤158	<198	<300	<6	>72	≥4.5	≥87	No	-12.36	-31.54	-2.63	-12.76	-16.90
291/288/286 /281	<7.5	≤158	<193	<300	<6	>72	≥4.5	≥87	No	-12.94	-31.74	-2.41	-13.15	-17.21
292/.../282 /281	<7.0	<140	≤205	<300	<6	>75	≥4.5	≥87	No	-13.33	-41.08	-4.24	-14.86	-21.26
292/.../283 /281	<7.0	<140	<200	<300	<6	>75	≥4.5	≥87	No	-14.22	-41.38	-3.99	-15.32	-21.63
292/.../284 /281	<7.0	<140	<198	<300	<6	>75	≥4.5	≥87	No	-14.49	-41.47	-3.90	-15.47	-21.75
292/.../286 /281	<7.0	<140	<193	<300	<6	>75	≥4.5	≥87	No	-15.06	-41.67	-3.68	-15.84	-22.05
292/291/288 /281	<7.0	<140	<208	<300	<6	>75	≥4.5	≥87	No	-12.98	-40.96	-4.33	-14.69	-21.13
293/.../282 /281	<7.0	<140	≤205	<300	<6	>75	≥4.5	≥92	No	-13.33	-41.08	-4.24	-14.86	-21.26
293/.../283 /281	<7.0	<140	<200	<300	<6	>75	≥4.5	≥92	No	-14.22	-41.38	-3.99	-15.32	-21.63

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
293/.../284 /281	<7.0	<140	<198	<300	<6	>75	≥4.5	≥92	No	-14.49	-41.47	-3.90	-15.47	-21.75
293/.../286 /281	<7.0	<140	<193	<300	<6	>75	≥4.5	≥92	No	-15.06	-41.67	-3.68	-15.84	-22.05
293/.../288 /281	<7.0	<140	<208	<300	<6	>75	≥4.5	≥92	No	-12.98	-40.96	-4.33	-14.69	-21.13
294/288/281	<7.5	≤158	<208	≤315	<6	>72	≥4.5	≥92	No	-10.55	-30.92	-3.06	-12.04	-16.32
294/288/282 /281	<7.5	≤158	≤205	≤315	<6	>72	≥4.5	≥92	No	-10.91	-31.04	-2.97	-12.22	-16.46
294/288/283 /281	<7.5	≤158	<200	≤315	<6	>72	≥4.5	≥92	No	-11.82	-31.36	-2.71	-12.70	-16.85
294/288/284 /281	<7.5	≤158	<198	≤315	<6	>72	≥4.5	≥92	No	-12.10	-31.45	-2.62	-12.87	-16.98
294/288/286 /281	<7.5	≤158	<193	≤315	<6	>72	≥4.5	≥92	No	-12.69	-31.65	-2.40	-13.26	-17.29
295/271	<7.5	≤158	<203	<300	<8	>65		≥92	No	-11.32	-31.18	-1.11	-7.29	-12.51
295/272	<7.5	≤158	<200	<300	<8	>65		≥92	No	-11.77	-31.34	-0.97	-7.56	-12.73
295/273	<7.5	≤158	<198	<300	<8	>65		≥92	No	-12.05	-31.43	-0.88	-7.74	-12.87
295/274	<7.5	≤158	<195	<300	<8	>65		≥92	No	-12.43	-31.56	-0.74	-8.00	-13.08
295/275	<7.5	≤158	<193	<300	<8	>65		≥92	No	-12.63	-31.63	-0.66	-8.16	-13.21
295/281	<7.5	≤158	<208	≤315	<8	>72	≥4.5	≥92	No	-11.57	-31.27	-3.28	-13.52	-17.51
295/282/281	<7.5	≤158	≤205	≤315	<8	>72	≥4.5	≥92	No	-11.93	-31.39	-3.19	-13.69	-17.64
295/283/281	<7.5	≤158	<200	≤315	<8	>72	≥4.5	≥92	No	-12.83	-31.70	-2.93	-14.18	-18.03
295/284/281	<7.5	≤158	<198	≤315	<8	>72	≥4.5	≥92	No	-13.11	-31.80	-2.84	-14.35	-18.17

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
295/285/281	<7.5	≤158	<195	≤315	<8	>72	≥4.5	≥92	No	-13.48	-31.92	-2.71	-14.59	-18.36
295/286/281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥92	No	-13.69	-31.99	-2.63	-14.74	-18.48
296/271	<7.5	≤158	<203	<300	<8	>65		≥87	Yes	-11.97	-31.41	-1.82	-13.61	-18.36
296/272	<7.5	≤158	<200	<300	<8	>65		≥87	Yes	-12.42	-31.56	-1.68	-13.86	-18.56
296/273	<7.5	≤158	<198	<300	<8	>65		≥87	Yes	-12.69	-31.65	-1.59	-14.03	-18.70
296/274	<7.5	≤158	<155	<300	<8	>65		≥87	Yes	-13.07	-31.78	-1.45	-14.28	-18.90
296/275	<7.5	≤158	<193	<300	<8	>65		≥87	Yes	-13.27	-31.85	-1.37	-14.43	-19.02
296/286/281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥87	Yes	-14.41	-32.24	-3.46	-19.71	-23.25
297/296/271	<7.5	≤158	<203	<300	<8	>65		≥92	Yes	-11.97	-31.41	-1.82	-13.61	-18.36
297/296/272	<7.5	≤158	<200	<300	<8	>65		≥92	Yes	-12.42	-31.56	-1.68	-13.86	-18.56
297/296/273	<7.5	≤158	<198	<300	<8	>65		≥92	Yes	-12.69	-31.65	-1.59	-14.03	-18.70
297/296/274	<7.5	≤158	<195	<300	<8	>65		≥92	Yes	-13.07	-31.78	-1.45	-14.28	-18.90
297/296/275	<7.5	≤158	<193	<300	<8	>65		≥92	Yes	-13.27	-31.85	-1.37	-14.43	-19.02
297/296/286 /281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥92	Yes	-14.41	-32.24	-3.46	-19.71	-23.25
298/296/271	<7.5	≤158	<203	<300	<6	>65		≥87	Yes	-11.23	-31.16	-1.73	-12.05	-17.12
298/296/272	<7.5	≤158	<200	<300	<6	>65		≥87	Yes	-11.68	-31.31	-1.59	-12.31	-17.32
298/296/273	<7.5	≤158	<198	<300	<6	>65		≥87	Yes	-11.96	-31.40	-1.50	-12.48	-17.46
298/296/274	<7.5	≤158	<195	<300	<6	>65		≥87	Yes	-12.34	-31.53	-1.36	-12.73	-17.66

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
298/296/275	<7.5	≤158	<193	<300	<6	>65		≥87	Yes	-12.55	-31.60	-1.28	-12.88	-17.78
298/296/286 /281	<7.5	≤158	<193	≤315	<6	>72	≥4.5	≥87	Yes	-13.49	-31.93	-3.08	-18.38	-22.18
299/.../273	<7.5	≤158	<198	<300	<6	>65		≥92	Yes	-11.96	-31.40	-1.50	-12.48	-17.46
299/.../274	<7.5	≤158	<195	<300	<6	>65		≥92	Yes	-12.34	-31.53	-1.36	-12.73	-17.66
299/.../275	<7.5	≤158	<193	<300	<6	>65		≥92	Yes	-12.55	-31.60	-1.28	-12.88	-17.78
299/.../286 /281	<7.5	≤158	<193	≤315	<6	>72	≥4.5	≥92	Yes	-13.49	-31.93	-3.08	-18.38	-22.18
299/298/296 /271	<7.5	≤158	<203	<300	<6	>65		≥92	Yes	-11.23	-31.16	-1.73	-12.05	-17.12
299/298/296 /272	<7.5	≤158	<200	<300	<6	>65		≥92	Yes	-11.68	-31.31	-1.59	-12.31	-17.32
300/.../272	<7.0	<140	<200	<300	<6	>65		≥87	Yes	-13.26	-41.05	-1.83	-12.42	-19.91
300/.../273	<7.0	<140	<198	<300	<6	>65		≥87	Yes	-13.53	-41.15	-1.74	-12.59	-20.04
300/.../274	<7.0	<140	<195	<300	<6	>65		≥87	Yes	-13.90	-41.27	-1.61	-12.84	-20.24
300/.../275	<7.0	<140	<193	<300	<6	>65		≥87	Yes	-14.11	-41.34	-1.52	-12.99	-20.36
300/.../286 /281	<7.0	<140	<193	≤315	<6	>72	≥4.5	≥87	Yes	-15.03	-41.66	-3.32	-18.49	-24.77
300/298/296 /271	<7.0	<140	<203	<300	<6	>65		≥87	Yes	-12.81	-40.90	-1.97	-12.17	-19.70

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
301/.../272	<7.0	<140	<200	<300	<6	>65		≥92	Yes	-13.26	-41.05	-1.83	-12.42	-19.91
301/.../273	<7.0	<140	<198	<300	<6	>65		≥92	Yes	-13.53	-41.15	-1.74	-12.59	-20.04
301/.../274	<7.0	<140	<195	<300	<6	>65		≥92	Yes	-13.90	-41.27	-1.61	-12.84	-20.24
301/.../275	<7.0	<140	<193	<300	<6	>65		≥92	Yes	-14.11	-41.34	-1.52	-12.99	-20.36
301/.../286 /281	<7.0	<140	<193	≤315	<6	>72	≥4.5	≥92	Yes	-15.03	-41.66	-3.32	-18.49	-24.77
301/300/... /271	<7.0	<140	<203	<300	<6	>65		≥92	Yes	-12.81	-40.90	-1.97	-12.17	-19.70
302/281	<7.5	≤158	<208	≤315	<8	>72	≥4.5	≥87	0<x≤14.9	-12.31	-31.52	-4.12	-18.55	-22.32
302/283/281	<7.5	≤158	<200	≤315	<8	>72	≥4.5	≥87	0<x≤14.9	-13.56	-31.95	-3.77	-19.18	-22.83
302/284/281	<7.5	≤158	<198	≤315	<8	>72	≥4.5	≥87	0<x≤14.9	-13.83	-32.04	-3.68	-19.34	-22.95
302/286/281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥87	0<x≤14.9	-14.41	-32.24	-3.46	-19.71	-23.25
303/302/281	<7.5	≤158	<208	≤315	<8	>72	≥4.5	≥92	0<x≤14.9	-12.31	-31.52	-4.12	-18.55	-22.32
303/302/283 /281	<7.5	≤158	<200	≤315	<8	>72	≥4.5	≥92	0<x≤14.9	-13.56	-31.95	-3.77	-19.18	-22.83
303/302/284 /281	<7.5	≤158	<198	≤315	<8	>72	≥4.5	≥92	0<x≤14.9	-13.83	-32.04	-3.68	-19.34	-22.95
303/302/286 /281	<7.5	≤158	<193	≤315	<8	>72	≥4.5	≥92	0<x≤14.9	-14.41	-32.24	-3.46	-19.71	-23.25
304/302/281	<7.5	≤158	<208	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-11.52	-31.25	-3.74	-17.33	-21.35
304/302/283 /281	<7.5	≤158	<200	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-12.77	-31.68	-3.39	-17.95	-21.84

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
304/302/284 /281	<7.5	≤158	<198	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-13.05	-31.78	-3.30	-18.10	-21.96
304/302/286 /281	<7.5	≤158	<193	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-13.63	-31.97	-3.09	-18.47	-22.26
305/.../283 /281	<7.5	≤158	<200	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-12.77	-31.68	-3.39	-17.95	-21.84
305/.../284 /281	<7.5	≤158	<198	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-13.05	-31.78	-3.30	-18.10	-21.96
305/.../286 /281	<7.5	≤158	<193	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-13.63	-31.97	-3.09	-18.47	-22.26
305/304/302 /281	<7.5	≤158	<208	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-11.52	-31.25	-3.74	-17.33	-21.35
306/.../283 /281	<7.0	≤158	<200	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-14.33	-41.42	-3.63	-18.06	-24.43
306/.../284 /281	<7.0	≤158	<198	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-14.60	-41.51	-3.54	-18.22	-24.55
306/.../286 /281	<7.0	≤158	<193	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-15.16	-41.70	-3.33	-18.58	-24.84
306/304/302 /281	<7.0	≤158	<208	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-13.09	-41.00	-3.98	-17.45	-23.93

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
307/.../283 /281	<7.0	<140	<200	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-14.33	-41.42	-3.63	-18.06	-24.43
307/.../284 /281	<7.0	<140	<198	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-14.60	-41.51	-3.54	-18.22	-24.55
307/.../286 /281	<7.0	<140	<193	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-15.16	-41.70	-3.33	-18.58	-24.84
307/306/... /302/281	<7.0	<140	<208	<300	<6	>72	≥4.5	≥87	0<x≤14.9	-13.09	-41.00	-3.98	-17.45	-23.93
308/.../283 /281	<7.0	<140	<200	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-14.33	-41.42	-3.63	-18.06	-24.43
308/.../284 /281	<7.0	<140	<198	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-14.60	-41.51	-3.54	-18.22	-24.55
308/.../286 /281	<7.0	<140	<193	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-15.16	-41.70	-3.33	-18.58	-24.84
308/307/... /302/281	<7.0	<140	<208	<300	<6	>72	≥4.5	≥92	0<x≤14.9	-13.09	-41.00	-3.98	-17.45	-23.93
309/.../283 /281	<7.0	<140	<200	<300	<6	>75	≥4.5	≥92	0<x≤14.9	-14.91	-41.62	-4.68	-20.24	-26.17
309/.../284 /281	<7.0	<140	<198	<300	<6	>75	≥4.5	≥92	0<x≤14.9	-15.18	-41.71	-4.59	-20.39	-26.29
309/.../286 /281	<7.0	<140	<193	<300	<6	>75	≥4.5	≥92	0<x≤14.9	-15.74	-41.90	-4.38	-20.74	-26.57
309/.../302 /281	<7.0	<140	<208	<300	<6	>75	≥4.5	≥92	0<x≤14.9	-13.68	-41.20	-5.03	-19.65	-25.70
310/271	<7.0	≤158	<203	<300	<8	>65		≥87	No	-12.90	-40.93	-1.35	-7.40	-15.29

Claim	RVP	T_{10}	T_{50}	T_{90}	Olefins	Paraffins	Aromatics	Octane	Oxygenate Required?	EPA Predicted HC Exhaust Reduction	EPA Predicted Total HC Reduction	EPA Predicted NO_x Reduction	EPA Predicted Exhaust Toxics Reduction	EPA Predicted Total Toxics Reduction
310/272	<7.0	≤158	<200	<300	<8	>65		≥87	No	-13.34	-41.08	-1.22	-7.67	-15.51
310/273	<7.0	≤158	<198	<300	<8	>65		≥87	No	-13.61	-41.18	-1.12	-7.85	-15.65
310/274	<7.0	≤158	<195	<300	<8	>65		≥87	No	-13.99	-41.30	-0.99	-8.11	-15.86
310/275	<7.0	≤158	<193	<300	<8	>65		≥87	No	-14.19	-41.37	-0.90	-8.27	-15.98
310/281	<7.0	≤158	<208	≤315	<8	>72	≥4.5	≥87	No	-13.14	-41.01	-3.52	-13.64	-20.28
310/282/281	<7.0	≤158	≤205	≤315	<8	>72	≥4.5	≥87	No	-13.49	-41.13	-3.43	-13.81	-20.42
310/283/281	<7.0	≤158	<200	≤315	<8	>72	≥4.5	≥87	No	-14.38	-41.44	-3.17	-14.30	-20.81
310/284/281	<7.0	≤158	<198	≤315	<8	>72	≥4.5	≥87	No	-14.65	-41.53	-3.08	-14.46	-20.95
310/285/281	<7.0	≤158	<195	≤315	<8	>72	≥4.5	≥87	No	-15.02	-41.65	-2.94	-14.71	-21.14
310/286/281	<7.0	≤158	<193	≤315	<8	>72	≥4.5	≥87	No	-15.22	-41.72	-2.86	-14.85	-21.26

Large Volume Ind. Claim	Combustion Ind. Claim	RVP	T_{10}	T_{50}	T_{90}	Olefin	Paraffin	Octane	Oxygenate Required
117(a)	142(e)	<7		≤210			>72	≥87	No
117(b)	142(c)	<7		≤210			>65	≥92	No
117(c)	142(e)	<7		<193		<10		≥87	No
117(d)	142(c)	<7		≤210		< 1		≥87	No
154(d)	142(h)	<7	≤158	≤215		<10		≥87	Yes up to 14.9% MTBE
117(e)	91	<7		≤210	<300	<10		≥87	No
	96	<7	≤158	≤210	<300	<10		≥87	No
154(a)	142(e)	<7.5	≤158	≤215	≤315	<10	>65	≥87	Yes
154(b)	142(f)	<7	≤158	≤215			>65	≥87	Yes
154(c)	142(g)	<7	≤158				>70	≥87	Yes

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup et al.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
1	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,571,439	6	5		polymer gas
2	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,579,990	4	40		polymer gas
3	2.6	.	.	0.0	72.6	27.4	*	100	.	.	.	.	.	98.5		US5,041,208	11	64	Pt-USDY	cat gas
4	3.0	231	326	3.5	43.0	53.5		100	.	.	.	.	.	89.7		US4,437,436	9	50	B	
5	3.6	.	.	0.0	47.5	52.5	*	100	.	.	.	.	.	94.1		US5,041,208	11	30	HDT	cat gas
6	3.6	.	.	0.0	50.3	49.7	*	100	.	.	.	.	.	94.5		US5,041,208	11	30	Pt-USDY	cat gas
7	3.8	284	368	.	.	.		.	.	.	.	.	.	86.5		US4,818,250	8	63	20/80	
8	4.1	177	207	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	A	2 comp T10=159
9	5.0	200	316	2.3	34.0	63.7		100	30.0	.	.	.	.	86.8		SAE 801352	11	App A-1	R-30	
10	5.1	258	378	6.1	24.8	69.1		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	9R	T10=184
11	5.2	247	.	22.8	30.5	46.6		100	.	.	.	.	.	84.8		US5,041,208	10	41	full	cat gas
12	5.2	234	312	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	4	
13	5.2	230	330	0.3	24.9	74.8	*	100	.	.	.	.	.	84.5		CRC 510	18	II,I	1	
14	5.2	216	227	.	.	.		.	10.0	.	.	.	.	101.0		US4,812,146	6	18	9	>57% arom
15	5.2	213	304	18.0	29.5	52.5	*	100	.	.	.	.	.	86.1		CRC 477	17	II,I	2	
16	5.2	.	.	22.8	30.5	46.7	*	100	.	.	.	.	.	84.8		US5,041,208	12	42	Joliet	cat gas
17	5.3	235	307	12.1	28.4	59.5	*	100	.	.	.	.	.	95.6		BM 7291	4,40	1	4	
18	5.3	207	308	19.0	27.5	53.5	*	100	.	.	.	.	.	91.5		CRC 477	17	II,I	13	
19	5.3	186	314	18.1	23.2	58.7		100	30.0	.	.	.	.	86.6		SAE 801352	11	App A-1	F-30	
20	5.4	231	323	15.0	37.5	47.5		100	.	.	.	.	.	86.3		SAE 770811	7	A-1	F-11	
21	5.4	205	302	18.0	28.5	53.5	*	100	.	.	.	.	.	88.8		CRC 477	17	II,I	6	
22	5.4	205	301	5.4	23.5	71.1	*	100	.	.	.	.	.	83.7		CRC 494	20	II,I	1	
23	5.4	201	338	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	B	
24	5.5	256	361	35.5	28.5	36.0		100	.	.	.	.	.	86.3		SAE 770811	8	A-1	F-18	
25	5.5	235	335	.	.	.		.	.	.	.	.	.	91.9		CRC 541	15	III,II	15	
26	5.5	223	330	20.5	36.0	43.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-6	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

ATTACHMENT P

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
27	5.6	243	340	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	D	
28	5.7	253	328	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-10	
29	5.7	235	335	.	.	.		.	.	.	.	.	.	87.9		US4,444,567	3	57	FT-266	Burns T10=164
30	5.7	218	294	0.6	22.3	77.1	*	100	.	.	.	.	.	90.9		CM-79-71	16	II,I	9	
31	5.7	216	325	1.5	40.4	58.1		100	15.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-15	
32	5.7	216	229	.	.	.		.	10.0	.	.	.	.	100.7		US4,812,146	4	14	1	>52% arom
33	5.7	215	303	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-10	
34	5.8	236	317	1.5	22.8	75.7	*	100	.	.	.	.	.	86.4		CM-79-71	16	II,I	1	
35	5.8	225	330	18.1	17.5	64.4	*	100	.	.	.	.	.	85.6		CRC 510	18	II,I	2	
36	5.8	224	322	2.1	43.4	54.5		100	5.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-5	
37	5.9	235	343	.	.	.		.	.	.	.	.	.	.		AP213,136	9		b	
38	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		CRC 520	19	III,I	16	
39	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		SAE 821211	3	1,2	16	
40	6.0	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	169	Fig 5	6A	
41	6.0	223	332	2.0	19.5	78.5	*	100	.	.	.	.	.	87.9		CRC 477	17	II,I	12	
42	6.0	223	330	2.0	19.5	78.5	*	100	.	.	.	.	.	85.6		CRC 477	17	II,I	5	
43	6.0	222	334	22.7	13.4	63.9	*	100	.	.	.	.	.	84.3		CM-79-71	16	II,I	2	
44	6.0	220	330	2.0	20.0	78.0	*	100	.	.	.	.	.	82.4		CRC 477	17	II,I	1	
45	6.0	217	328	11.5	39.0	49.5		100	.	.	.	.	.	87.6		SAE 770811	7	A-1	F-14	
46	6.0	216	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	6	>52% arom
47	6.0	198	303	.	.	.		.	.	.	.	.	.	.	P	SAE 780651	4	2	low	
48	6.1	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	BL	
49	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		CRC 520	19	III,I	10	
50	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		SAE 821211	3	1,2	10	
51	6.1	220	325	1.5	41.3	57.2		100	10.0	.	.	.	.	86.3		SAE 801352	11	App A-1	R-10	
52	6.1	220	312	0.3	23.4	76.3	*	100	.	.	.	.	.	89.2		CRC 510	18	II,I	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey
Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
53	6.1	212	326	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XE	
54	6.1	170	208	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	B	2 comp
55	6.2	254	370	.	.	.		.	.	.	.	.	.	.		SAE 750419		App 1	A	
56	6.2	226	331	1.6	44.6	53.8		100	.	.	.	.	.	86.4		SAE 801352	11	App A-1	R-0	
57	6.2	216	228	.	.	.		.	8.0	.	.	.	.	100.5		US4,812,146	4	39	5	>52% arom
58	6.2	215	314	8.5	32.0	59.5	*	100	.	.	.	.	.	88.5		CRC 477	17	II,I	11	
59	6.2	212	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	1	
60	6.3	251	336	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	28	
61	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		CRC 520	19	III,I	3	
62	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		SAE 821211	3	1,2	3	
63	6.3	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	166	4	6A	
64	6.3	224	346	22.5	26.7	50.8	*	100	.	.	.	.	.	88.0		CM-79-71	16	II,I	12	
65	6.3	217	229	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	5	41	9	>57% arom
66	6.3	210	352	.	.	.		.	.	.	.	.	.	.		AP213,136	11		a	
67	6.3	195	333	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	AL	
68	6.3	194	300	1.6	27.0	71.4	*	100	.	.	.	.	.	87.2		CRC 494	20	II,I	6	
69	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		CRC 520	19	III,I	9	
70	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		SAE 821211	3	1,2	9	
71	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		CRC 520	19	III,I	13	
72	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		SAE 821211	3	1,2	13	
73	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		CRC 520	19	III,I	12	
74	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		SAE 821211	3	1,2	12	
75	6.4	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	7	
76	6.4	218	327	1.0	40.5	58.5		100	.	.	.	.	.	84.4		SAE 770811	7	A-1	F-3	
77	6.4	206	300	6.0	42.0	52.0	*	100	.	.	.	.	.	92.5		CRC 477	17	II,I	14	
78	6.4	203	315	17.5	30.9	51.6	*	100	.	.	.	.	.	85.1		CM-79-71	16	II,I	8	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole- fins	% Arom- atics	% Satu- rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
79	6.4	197	295	15.7	25.3	59.0		100	.	.	.	.	.	86.8		SAE 730474	1444	1	A	
80	6.4	195	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	5	
81	6.5	257	339	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	B1	
82	6.5	217	228	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	4	39	2	>56% arom
83	6.5	215	328	12.0	37.5	50.5		100	.	.	.	.	.	86.5		SAE 770811	7	A-1	F-9	
84	6.5	199	336	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	2	
85	6.5	.	.	.	.	.		.	.	.	.	.	.	.		US3,886,759	5	35		
86	6.6	260	335	7.0	53.0	40.0		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-16	
87	6.6	252	366	.	.	.		.	.	.	.	.	.	87.0		US4,818,250	8	63	10/90	
88	6.6	245	318	1.0	27.3	71.7	*	100	.	.	.	.	.	87.9		CM-79-71	16	II,I	6	
89	6.6	243	344	.	31.6	.	*	.	.	.	.	.	.	91.3		HES 35-32030	11	9	6.5	Avg of 3
90	6.6	234	335	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	I	
91	6.6	232	318	4.0	28.3	67.7	*	100	.	.	.	.	.	89.1		CRC 445	17	II	2	
92	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		CRC 451	19	III	I-2	
93	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		SAE 710675	2	2	2	
94	6.6	232	315	4.0	26.0	70.0	*	100	.	.	.	.	.	90.9		CRC 451	19	III	T (b)	
95	6.6	231	338	.	.	.		.	4.5	.	.	.	.	90.9		CRC 541	15	III,II	24	
96	6.6	226	359	4.3	21.7	74.0		100	.	.	.	.	.	87.6		API 4310	8	I	I	
97	6.6	225	338	.	.	.		.	9.6	.	.	.	.	92.0		CRC 541	15	III,II	25	
98	6.6	183	360	15.0	16.1	68.9		100	.	.	.	.	.	74.4		CRC 454	22	II	AU-8-79	
99	6.6	.	.	4.5	40.2	55.3		100	.	.	.	.	.	90.8		SAE 900153	2	1	ES2	T50>215
100	6.7	241	343	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	4	
101	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		CRC 520	19	III,I	8	
102	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		SAE 821211	3	1,2	8	
103	6.7	232	336	19.7	40.5	39.8	*	100	.	.	.	.	.	87.5		SAE 780612	175	2	3	
104	6.7	220	330	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey 20:10 Tuesday, October 18, 1994

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole- fins	% Arom- atics	% Satu- rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
105	6.7	220	317	9.9	24.3	65.8	*	100	.	.	.	.	.	87.3		CM-79-71	16	II,I	13	
106	6.7	213	302	3.8	14.2	82.0	*	100	.	.	.	.	.	86.7		CRC 510	18	II,I	5	
107	6.7	210	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	6	
108	6.7	210	302	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-20	
109	6.7	.	.	11.3	49.4	39.3	*	100	.	.	.	.	.	91.8		US5,041,208	12	42	Net prod	cat gas
110	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		CRC 520	19	III,I	5	
111	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		SAE 821211	3	1,2	5	
112	6.8	232	325	15.0	40.5	44.5		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-17	
113	6.8	228	338	.	.	.		.	.	.	.	.	8.7	90.9		CRC 541	15	III,II	23	
114	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		CRC 520	19	III,I	15	
115	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		SAE 821211	3	1,2	15	
116	6.8	217	341	2.9	26.7	70.4		100	.	.	.	.	.	91.7		API 4310	8	I	II	
117	6.8	217	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	4	>52% arom
118	6.8	216	326	10.9	24.7	64.4	*	100	.	.	.	.	.	88.8		CRC 510	18	II,I	13	
119	6.8	208	335	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	A1	
120	6.8	198	305	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	III	
121	6.8	195	286	32.2	9.0	58.8		100	.	.	.	.	.	74.4		CRC 454	23	III	AU-10-79	
122	6.8	191	325	.	.	.		.	.	.	23.5	.	.	92.9		SAE 902132	2	2	F	
123	6.8	191	319	.	.	.		.	.	.	.	.	.	.		SAE 730593	2107	App A-1	V-4	
124	6.8	185	331	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	12	
125	6.8	181	328	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	7	
126	6.8	180	283	.	.	.		.	.	.	.	.	.	.	P	SAE 841386	8	App A	2	
127	6.9	246	329	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-20	
128	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 519	D-6	D-V	331	
129	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 525	C-4	C-IV	331-80	
130	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 519	D-5	D-V	328	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey
Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
131	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 525	C-1	C-I	328-80	
132	6.9	234	336	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	14	
133	6.9	232	337	.	.	.		.	.	.	.	4.7	.	90.8		CRC 541	15	III,II	20	
134	6.9	232	337	.	.	.		.	.	.	.	.	4.5	90.5		CRC 541	15	III,II	22	
135	6.9	228	335	.	.	.		.	.	.	.	.	.	86.7		CRC 541	15	III,II	2	
136	6.9	227	345	21.7	33.1	45.2	*	100	.	.	.	.	.	85.7		CM-79-71	16	II,I	16	
137	6.9	226	335	.	.	.		.	.	.	.	9.3	.	91.7		CRC 541	15	III,II	21	
138	6.9	224	304	1.0	34.0	65.0	*	100	.	.	.	.	.	89.7		CRC 451	19	III	S	
139	6.9	216	301	5.7	33.3	61.0	*	100	.	.	.	.	.	86.2		CM-79-71	16	II,I	3	
140	6.9	214	337	3.4	35.4	61.2		100	.	.	.	.	.	86.9		SAE 780949	13	App B-3	8R	
141	6.9	.	.	18.8	31.4	49.8		100	.	.	.	.	.	90.9		SAE 900153	2	1	ES3	T50>215
142	7.0	237	341	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	14	
143	7.0	234	294	11.6	27.5	60.9	*	100	.	.	.	.	.	90.2		CRC 494	20	II,I	8	
144	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		CRC 520	19	III,I	7	
145	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		SAE 821211	3	1,2	7	
146	7.0	232	327	13.9	26.1	60.0	*	100	.	.	.	.	.	93.4		CRC 510	18	II,I	12	
147	7.0	231	327	1.5	29.7	68.8	*	100	.	.	.	.	.	91.1		CRC 510	18	II,I	11	
148	7.0	229	.	.	.	.		.	.	.	.	.	.	.	P	SAE 710136	9	2	V	
149	7.0	226	312	4.7	32.0	63.3		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	11R	
150	7.0	226	311	1.0	21.8	77.2	*	100	.	.	.	.	.	89.3		CRC 494	20	II,I	9	
151	7.0	226	253	5.1	70.9	24.0		100	.	.	.	.	.	95.9		CRC 515	D-6	D-V	325	
152	7.0	224	367	35.1	18.6	46.3		100	.	.	.	.	.	79.9		CRC 451	103	D-XI	242-71	
153	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		CRC 520	19	III,I	1	
154	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		SAE 821211	3	1,2	1	
155	7.0	221	319	3.0	16.5	80.5	*	100	.	.	.	.	.	91.5		CRC 494	20	II,I	10	
156	7.0	216	314	11.6	14.5	73.9	*	100	.	.	.	.	.	92.1		CRC 510	18	II,I	10	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
157	7.0	215	314	24.3	15.9	59.8	*	100	.	.	.	.	.	91.3		CRC 510	18	II,I	7	
158	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,313,738	2	62	FT-116	.28 wt% S
159	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,322,304	3	60	FT-116	.28 wt% S
160	7.0	214	323	.	.	.		.	.	.	.	.	.	.		SAE 892090	4	5	first	
161	7.0	212	309	9.7	22.8	67.5	*	100	.	.	.	.	.	88.3		CRC 494	20	II,I	13	
162	7.0	211	328	21.0	32.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-4	
163	7.0	210	310	7.5	31.5	61.0	*	100	.	.	.	.	.	88.4		CRC 477	17	II,I	8	
164	7.0	208	340	14.0	20.0	66.0		100	.	.	.	.	.	74.9		CRC 493	114	D-V	286	
165	7.0	208	317	10.5	28.5	61.0	*	100	.	.	.	.	.	90.8		CRC 477	17	II,I	15	
166	7.0	205	319	17.9	28.3	53.8	*	100	.	.	.	.	.	83.4		CM-79-71	16	II,I	4	
167	7.0	204	321	21.0	30.5	48.5		100	.	.	.	.	.	86.1		SAE 770811	7	A-1	F-12	
168	7.0	204	291	12.6	8.3	79.1	*	100	.	.	.	.	.	87.8		CM-79-71	16	II,I	14	
169	7.0	195	299	9.8	16.0	74.2		100	.	.	.	.	.	86.8		CRC 454	22	II	AU-8-91	
170	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 467	96	D-IV	261	
171	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 476	48	D-IV	261	
172	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		CRC 445	86	D-IX	239-71	
173	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.5		CRC 451	103	D-XI	239-71	
174	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		SAE 710675	15	A-3	239-71	
175	7.0	192	325	22.0	25.8	52.2		100	15.0	.	.	.	.	85.9		SAE 801352	11	App A-1	F-15	
176	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		CRC 520	19	III,I	2	
177	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		SAE 821211	3	1,2	2	
178	7.1	225	303	9.2	28.8	62.0	*	100	.	.	.	.	.	87.7		CM-79-71	16	II,I	24	
179	7.1	220	308	1.7	33.0	65.3	*	100	.	.	.	.	.	89.3		CM-79-71	16	II,I	11	
180	7.1	220	229	.	.	.		.	0.0	.	.	.	.	100.5		US4,812,146	5	12	8	>60% arom
181	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 467	96	D-IV	265	
182	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 476	48	D-IV	265	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey
Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
183	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		SAE 750937	6	6	265	
184	7.1	214	301	11.4	16.6	72.0	*	100	.	.	.	.	.	89.2		CM-79-71	16	II,I	10	
185	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 570	C-1	C-1	368-89/90	
186	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 575	C-1	C-1	368-89/90	
187	7.1	207	303	35.1	17.7	47.2	*	100	.	.	.	.	.	85.4		CM-79-71	16	II,I	7	
188	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 570	C-3	C-3	372-89/90	
189	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 575	C-3	C-3	372-89/90	
190	7.1	203	314	7.5	41.5	51.0	*	100	.	.	.	.	.	88.7		CRC 477	17	II,I	7	
191	7.1	203	307	0.5	19.0	80.5		100	.	.	.	.	.	86.0		SAE 770811	7	A-1	F-1	
192	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 519	D-5	D-V	327	
193	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 525	C-1	C-I	327-80	
194	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 467	96	D-IV	263	
195	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 476	48	D-IV	263	
196	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		SAE 750937	6	6	263	
197	7.2	244	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	3	
198	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		CRC 520	19	III,I	18	
199	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		SAE 821211	3	1,2	18	
200	7.2	236	336	2.1	41.9	56.0		100	.	.	.	.	.	89.1		US4,437,436	9	50	C	
201	7.2	232	334	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-3	
202	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 544	C-1	C-I	351-84	
203	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 548	C-1	C-I	351-84	
204	7.2	224	304	6.0	29.0	65.0	*	100	.	.	.	.	.	87.3		CRC 451	19	III	T	
205	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		CRC 445	86	D-IX	242-71PB	
206	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		SAE 710675	15	A-3	242-71PB	
207	7.2	214	309	13.5	30.0	56.5		100	.	.	.	.	.	86.1		CRC 454	23	III	AU-10-91	
208	7.2	213	353	15.0	9.3	75.6		100	.	.	.	.	.	87.7		US4,294,587	2	42	FT-175	Burns

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

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RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
209	7.2	208	345	20.0	22.0	58.0		100	.	.	.	.	.	74.3		CRC 493	114	D-V	289	
210	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		SAE 750763	2	2	Clr Comm	
211	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		BERC/RI-76	7	2	Clr Comm	
212	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 497	143	D-V	292	
213	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 500	76	D-IV	292	
214	7.2	203	283	11.7	8.3	80.0		100	.	.	.	.	.	88.1		CRC 451	103	D-XI	240-71	
215	7.2	202	314	7.0	42.5	50.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	3	
216	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 467	96	D-IV	260	
217	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 476	48	D-IV	260	
218	7.2	197	311	0.0	47.0	53.0		100	.	.	.	.	.	96.2		CRC 493	114	D-V	288	
219	7.2	195	345	15.0	17.0	68.0		100	.	.	.	.	.	74.0		CRC 479	85	D-V	269	
220	7.2	195	220	7.0	28.0	65.0		100	.	.	.	.	.	89.3		SAE 730474	1444	1	C	
221	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 561	C-1	C-I	362-87/88	
222	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 566	D-7	D-III	362	
223	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 567	6	1	362-87/88	
224	7.3	235	330	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-5	
225	7.3	231	327	12.0	41.5	46.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-7	
226	7.3	230	333	3.2	29.1	67.7	*	100	.	.	.	.	.	88.8		CM-79-71	16	II,I	22	
227	7.3	230	329	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XF	
228	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 445	86	D-IX	243-71	
229	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 451	103	D-XI	243-71	
230	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		SAE 710675	15	A-3	243-71	
231	7.3	219	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	2	
232	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 523	D-3	D-III	335	
233	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 525	C-4	C-IV	335-81	
234	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 533	C-4	C-IV	335-81	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

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RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
235	7.3	217	229	.	.	.		.	7.0	.	.	.	.	100.3		US4,812,146	4	39	7	>53% arom
236	7.3	212	314	11.0	31.0	58.0	*	100	.	.	.	.	.	88.2		CRC 477	17	II,I	10	
237	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 561	C-3	C-III	365-87/88	
238	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 566	D-7	D-III	365	
239	7.3	201	310	10.9	23.3	65.8	*	100	.	.	.	.	.	88.3		SAE 740520	3	2	10	
240	7.3	197	327	21.0	28.0	51.0		100	.	.	.	.	.	84.5		SAE 770811	7	A-1	F-6	
241	7.3	195	306	17.0	17.0	66.0		100	.	.	.	.	.	80.6		CRC 479	85	D-V	272	
242	7.3	187	325	28.0	21.5	50.5		100	15.0	.	.	.	.	86.2		SAE 801352	11	App A-1	F-15′	
243	7.3	.	.	.	.	.		.	.	.	.	.	.	90.4		US4,899,014	11	37	FG	cat gas
244	7.3	.	.	.	.	.		.	.	.	.	.	.	90.3		US4,899,014	11	37	FG+	cat gas
245	7.4	230	289	2.3	58.9	38.8		100	.	.	.	.	.	96.5		CRC 515	D-5	D-V	322	
246	7.4	225	296	5.0	49.0	47.0		101	.	.	.	.	.	96.2		CRC 493	114	D-V	291	
247	7.4	217	230	.	.	.		.	7.0	.	.	.	.	100.2		US4,812,146	4	39	3	>50% arom
248	7.4	216	313	9.5	30.0	60.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	4	
249	7.4	213	330	11.0	26.5	62.5		100	.	.	.	.	.	88.6		SAE 770811	7	A-1	F-13	
250	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 544	C-4	C-IV	353-84	
251	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 548	C-3	C-III	353-84	
252	7.4	205	318	11.0	20.0	69.0		100	.	.	.	.	.	86.3		CRC 493	114	D-V	287	
253	7.4	204	339	15.0	20.0	65.0		100	.	.	.	.	.	76.6		CRC 488	97	D-V	280	
254	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		CRC 445	86	D-IX	240-71PB	
255	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		SAE 710675	15	A-3	240-71PB	
256	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	A	
257	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	B	
258	7.4	202	286	5.0	53.0	42.0		100	.	.	.	.	.	96.3		CRC 488	97	D-V	282	
259	7.4	.	.	.	.	.		.	.	.	.	.	.	89.8		US4,873,389	10	18	1	cat gas
260	7.4	.	.	.	.	.		.	.	.	.	.	.	90.0		US4,873,389	10	18	2	cat gas

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey 20:10 Tuesday, October 18, 1994

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
261	7.5	240	339	6.2	28.9	64.9		100	.	.	.	.	.	90.3		SAE 780949	12	App B-2	11P	
262	7.5	237	335	6.9	24.5	68.6	*	100	.	.	.	.	.	92.5		CRC 494	20	II,I	12	
263	7.5	234	339	.	.	.		.	.	4.3	.	.	.	91.1		CRC 541	15	III,II	18	
264	7.5	232	327	.	.	.		.	.	.	.	.	.	90.6		CM-125-78	139	C-8	ET-2 base	
265	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 570	C-3	C-3	373-89/90	
266	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 575	C-3	C-3	373-89/90	
267	7.5	230	337	.	.	.		.	.	8.4	.	.	.	91.9		CRC 541	15	III,II	19	
268	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 548	C-3	C-III	360-85/86	
269	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 553	C-3	C-III	360-85/86	
270	7.5	228	367	.	.	.		.	.	.	.	.	.	85.7		CRC 541	15	III,II	27	
271	7.5	220	292	0.1	30.5	69.4	*	100	.	.	.	.	.	87.1		CRC 510	18	II,I	6	
272	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		CRC 445	86	D-IX	241-71PB	(6)
273	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		SAE 710675	15	A-3	241-71PB	
274	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 467	96	D-IV	262	
275	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 476	48	D-IV	262	
276	7.5	218	289	12.5	23.7	63.8		100	.	.	.	.	.	94.5		CRC 451	103	D-XI	244-71	
277	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 570	C-1	C-1	370-89/90	
278	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 575	C-1	C-1	370-89/90	
279	7.5	216	363	10.1	24.0	62.9		97	4.9	.	.	.	.	87.7		SAE 902129	5	1	EC-1	10/90 (7)
280	7.5	216	282	6.9	32.4	60.7		100	.	.	.	.	.	94.8		SAE 730474	1444	1	B	
281	7.5	215	350	32.5	25.0	42.5	*	100	.	.	.	.	.	88.0		CRC 510	18	II,I	4	
282	7.5	214	344	.	.	.		.	9.7	.	.	.	.	87.9		CRC 541	15	III,II	12	
283	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		CRC 445	86	D-IX	244-71PB	
284	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		SAE 710675	15	A-3	244-71PB	
285	7.5	210	325	15.0	19.0	66.0		100	.	.	.	.	.	77.6		CRC 488	97	D-V	277	
286	7.5	209	320	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XC	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
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Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole- fins	% Arom- atics	% Satu- rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
287	7.5	208	255	0.0	7.0	76.0		83	10.4	.	.	.	.	86.7		RFG Clean Air		X	9	7/90 (8)
288	7.5	204	335	.	.	.		.	.	.	12.7	.	.	90.7		SAE 902132	2	2	D	
289	7.5	200	327	8.6	22.7	68.7	*	100	.	.	.	.	.	86.3		CM-79-71	16	II,I	19	
290	7.5	197	317	5.4	19.0	75.6		100	.	.	.	.	.	75.8		CRC 515	D-5	D-V	320	
291	7.5	196	304	0.0	19.0	60.0		79	11.3	.	.	.	.	86.8		RFG Clean Air		X	8	7/90 (8)
292	7.5	185	331	0.4	30.6	69.0	*	100	.	.	.	.	.	87.3		SAE 750451	8	I	2	
293	7.5	.	.	.	.	.		.	.	.	.	.	.	.		GMR-6589	23	4	Minimum	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

91. [redacted] A method for operating an automotive vehicle that [redacted] aids in minimizing the amount of at least one gaseous pollutant selected from the group consisting of NOx, CO, and hydrocarbons in the exhaust emissions discharged into the atmosphere, the automotive vehicle having a spark-induced, internal combustion engine and a catalytic converter, the method comprising:

[redacted] (1) introducing into the engine an unleaded gasoline having

(a) a Reid Vapor Pressure less than 7.0 psi,

(b) a 50% D-86 distillation point no greater than 210° F.,

(c) an olefin content less than [redacted] 10 vol.%,

(d) a 90% D-86 distillation point less than 300° F., and

(e) an octane value of at least 87;

and thereafter

(2) combusting the unleaded gasoline in said engine;

(3) [redacted] contacting at least some of the resultant engine exhaust emissions with the catalytic converter; and

(4) [redacted] discharging the exhaust emissions from the catalytic converter to the atmosphere.

92. [redacted] A method as defined in claim 91 wherein the unleaded gasoline has an olefin content less than [redacted] 8 volume percent.

94. [redacted] A method as defined in claim 91 [redacted] wherein the gasoline has a Reid Vapor Pressure no greater than 6.8 psi and a maximum D-86 10% Distillation Point of 140° F.

95. A method as defined in claim 94 wherein the Reid Vapor Pressure of the unleaded gasoline is no greater than 6.5 psi.

96. [redacted] A method for reducing the amount of at least one gaseous pollutant emitted in automotive exhaust emissions, comprising:

[redacted] (1) introducing into a spark-induced automotive internal combustion engine in an automotive vehicle equipped with a catalytic converter for treating exhaust emissions, an unleaded gasoline having

(a) a Reid Vapor Pressure less than 7.0 psi,

(b) a 50% D-86 distillation point no greater than 210° F.,

(c) an olefin content less than 10 vol.%,

(d) a 90% D-86 distillation point less than 300° F.,

(e) an octane value of at least 87; and

(f) a 10% D-86 distillation point no greater than 158° F.; and

[redacted] (2) combusting the gasoline in said engine to yield exhaust emissions, which, after treatment in the catalytic converter, have, in comparison to combusting according to the Federal Test Procedure a fuel having the properties for blend A/O AVE shown in TABLE 2, a reduced amount of at least one gaseous pollutant selected from the group consisting of NO_x, CO, and unburned hydrocarbons.

98. [redacted] A method as defined in claim 91 [redacted] wherein the unleaded gasoline has [redacted] a D-86 10% Distillation point no greater than [redacted] 140° F. [[redacted]]

99. [redacted] A method as defined in claim 91 wherein the unleaded gasoline has [redacted] an olefin content less than [redacted] 6 volume percent.

100. [redacted] The method [redacted] of claim 91, 94, 96 or 99 in which the unleaded gasoline being combusted in said engine contains one or more added oxygenates and meets all the requirements of at least

one of the Class A, Class B, Class C, Class D, and Class E gasolines set forth in TABLE 1.

101. The method of claim 100 resulting in the reduction of NO_x emitted in the exhaust emissions from said catalytic converter.

102. The method of claim 100 resulting in the reduction of unburned hydrocarbons emitted in the exhaust emissions from said catalytic converter.

103. The method of claim 100 resulting in the reduction of CO emitted in the exhaust emissions from said catalytic converter.

104. The method of claim 100 wherein said catalytic converter is a three-way catalytic converter, and the total measured amount of NO_x, CO, and hydrocarbons emitted from said converter is reduced by at least 10% in comparison to fuel A/O AVE in Table 2 when combusted in the same engine under the same conditions as said unleaded gasoline according to the Federal Test Procedure.

105. [redacted] The method of claim 100 wherein said unleaded gasoline contains one or more oxygenates in a total oxygen concentration between the equivalent of about 10.1 and [redacted] 14.9 vol.% methyl tertiary butyl ether.

106. [redacted]) [redacted]

[redacted];

[redacted]

[redacted] The method of claim 105 wherein said unleaded gasoline contains greater than 65 volume percent paraffins.

107. [redacted] The method of claim [redacted] 105 wherein said unleaded gasoline contains greater than 72 volume percent paraffins.

108. [redacted] The method of claim [redacted] 100 wherein said unleaded gasoline contains greater than 65 volume percent paraffins.

117. [redacted] A method of aiding in [redacted] minimizing air pollution caused by [redacted] automobiles comprising the steps of:

(1) producing in an oil refinery a substantial amount of [redacted] unleaded gasoline selected from the group consisting of:

(a) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point no greater than 210 °F, and a paraffin content greater than 72 volume percent;

(b) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 92, a 50% D-86 distillation point no greater than 210 °F, and a paraffin content greater than 65 volume percent;

(c) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point less than 193 °F, and an olefin content less than 10 volume percent;

(d) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point no greater than 210 °F, and an olefin content less than 1 volume percent; and

(e) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point no greater than 210 °F, an olefin content less than 10 volume percent, and a 90% D-86 distillation point less than 300 °F. [[redacted];

(2) delivering said unleaded gasoline to a substantial number of gasoline service stations distributed within a geographical [redacted] region with significant air pollution caused in substantial part by the emission of exhaust gases from the operation of automobiles within said region; and

(3) dispensing the unleaded gasoline from said gasoline service stations into a substantial number of automobiles for subsequent combustion therein, said automobiles having catalytic converters for treating exhaust emissions.

118. The method of claim 117 performed during a time period of one month wherein the amount of said unleaded gasoline dispensed in step (3) during said month is the equivalent of at least 100,000 gallons of gasoline per day.

119. The method of claim 117 performed during a time period of one week wherein the amount of said unleaded gasoline dispensed in step (3) during said week is at least 10,000,000 gallons of gasoline.

120. The method of claim 117 wherein the amount of said unleaded gasoline dispensed in step (3) over the course of one month is equivalent to at least 25% of the amount dispensed by all service stations in said region for said month.

121. The method of claim 117, 118, 119, or 120 wherein said gasoline produced in step (1) is gasoline (a).

122. The method of claim 121 wherein the gasoline produced in step (1) has an olefin content less than 10 volume percent and a 90% D-86 distillation point no greater than 315 °F.

123. The method of claim 122 wherein the gasoline produced in step (1) has an olefin content less than 6 volume percent.

124. The method of claim 122 wherein the gasoline produced in step (1) has a 50% D-86 distillation point less than 200 °F.

125. The method of claim 117, 118, 119, or 120 wherein said gasoline produced in step (1) is gasoline (b).

126. The method of claim 125 wherein the gasoline produced in step (1) has an olefin content less than 6 volume percent and a 90% D-86 distillation point no greater than 315 °F.

127. The method of claim 126 wherein the gasoline produced in step (1) has a 50% D-86 distillation point less than 200 °F.

128. [redacted] The method of claim 117 [redacted] or 119 [redacted] wherein said gasoline produced in step (1) is gasoline (c).

129. The method of claim 128 wherein the gasoline produced in step (1) has an olefin content less than 6 volume percent and a 90% D-86 distillation point no greater than 315 °F.

130. The method of claim 129 wherein the gasoline produced in step (1) has a paraffin content greater than 65 volume percent.

131. [redacted] The method of claim 117 [redacted] wherein said gasoline produced in step (1) is gasoline (d).

132. The method of claim 131 wherein said gasoline (d) has a paraffin content greater than 65 volume percent and a 90% D-86 distillation point less than 300 °F.

133. The method of claim 117, 118, 119, or 120 wherein said gasoline produced in step (1) is gasoline (e).

134. [redacted] The method of claim 133 wherein said unleaded gasoline produced in step (1) contains one or more oxygenates in a total oxygen concentration between the equivalent of about 10.1 and [redacted] 14.9 vol.% methyl tertiary butyl ether.

135. [redacted] The method of claim [redacted] 134 wherein the gasoline produced in step (1) has a paraffin content greater than 65 volume percent.

136. [redacted] The method of claim [redacted] 134 wherein said unleaded gasoline produced in step (1) contains less than 8 volume percent olefins [redacted].

137. [redacted] The method of claim 136 wherein said unleaded gasoline produced in step (1) contains less than 6 volume percent olefins but more than 72 volume percent paraffins.

138. [redacted] The method of claim [redacted] 117, 118, 119, or 120 wherein said unleaded gasoline produced in step (1) contains [redacted] one or more added oxygenates.

139. [redacted] The method of claim [redacted] 117, 118, 119, or 120 wherein [redacted] said unleaded gasoline produced in step (1) [[redacted] contains one or more oxygenates in a total oxygen concentration between the equivalent of about 10.1 and 14.9 vol.% methyl tertiary butyl ether.

142. [redacted]) A method for [redacted]] aiding in minimizing the amount of at least one gaseous pollutant selected from the group consisting of NOx, CO, and hydrocarbons emitted in automotive exhaust emissions, comprising:

(1) introducing, into a spark-induced automotive internal combustion engine in an automotive vehicle equipped with a catalytic converter for treating exhaust emissions, an unleaded gasoline selected from the group consisting of:

(a) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point no greater than 210 °F, and a paraffin content greater than 72 volume percent;

(b) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 92, a 50% D-86 distillation point no greater than 210 °F, and a paraffin content greater than 65 volume percent;

(c) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point less than 193 °F, and an olefin content less than 10 volume percent;

(d) unleaded gasolines having a Reid Vapor Pressure less than 7.0 psi, an octane value of at least 87, a 50% D-86 distillation point no greater than 210 °F, and an olefin content less than 1 volume percent; [redacted]

(e) unleaded, oxygenated gasolines having a Reid Vapor Pressure less than [redacted] 7.5 psi, an octane value of at least 87, a 10% D-86 distillation point no greater than 158 °F, a 50% D-86 distillation point no greater than [redacted] 215 °F, a 90% D-86 distillation point no greater than 315 °F., a paraffin content greater than 65 volume percent, and an olefin content less than 10 volume percent [[redacted];

(f) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., a paraffin content greater than 65 volume percent, and a 50% D-86 distillation point

no greater than 215 °F.;

(g) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., and a paraffin content greater than 70 volume percent; and

(h) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., a 50% D-86 distillation point no greater than 215 °F, an olefin content less than 10 volume percent, and the oxygenates are present in a total oxygen concentration no greater than the equivalent provided by about 14.9 volume percent methyl tertiary butyl ether;

(2) combusting the gasoline in said engine, and

(3) passing emissions from said engine through the catalytic converter to be treated therein.

143. The method of claim 142 wherein the gasoline introduced into said engine is unleaded gasoline (a).

144. The method of claim 142 wherein the gasoline introduced into said engine is unleaded gasoline (b).

145. The method of claim 142 wherein the gasoline introduced into said engine is unleaded gasoline (c).

146. The method of claim 142 wherein the gasoline introduced into said engine is unleaded gasoline (d).

147. The method of claim 142 wherein the gasoline introduced into said engine is unleaded gasoline (e).

148. [redacted] The method of claim 147 wherein said unleaded gasoline [redacted] has a 90% D-86 distillation point no greater than 300° F.

149. [redacted] The method of claim 143 or 144 [redacted] wherein said unleaded gasoline contains less than 6 volume percent olefins and the 90% D-86 distillation point is no greater than 315°F.

150. [redacted] The method of claim [redacted] 147 wherein said unleaded gasoline contains one or more oxygenates in a total oxygen concentration between the equivalent of about 10.1 and 14.9 vol.% methyl tertiary butyl ether.

151. The method of claim 150 wherein the unleaded gasoline contains greater than 72 volume percent paraffins.

152. The method of claim 150 wherein the Reid Vapor Pressure is less than 7.0 psi.

153. The method of claim 152 wherein the unleaded gasoline contains greater than 72 volume percent paraffins.

154. A method of aiding in minimizing air pollution caused by automobiles comprising the steps of:

(1) producing in an oil refinery a substantial amount of unleaded, oxygenated gasoline selected from the group consisting of

(a) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.5 psi, a 10% D-86 distillation point no greater than 158° F., a 50% D-86 distillation point no greater than 215 °F., a 90% D-86 distillation point no greater than 315 °F., a paraffin content greater than 65 volume percent, and an olefin content less than 10 volume percent;

(b) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., a paraffin content greater than 65 volume percent, and a 50% D-86 distillation point no greater than 215 °F.;

(c) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., and a paraffin content greater than 70 volume percent; and

(d) unleaded, oxygenated gasolines of octane value at least 87 with a Reid Vapor Pressure less than 7.0 psi, a 10% D-86 distillation point no greater than 158° F., a 50% D-86 distillation point no greater than 215 °F., an olefin content less than 10 volume percent, and the oxygenates are present in a total oxygen concentration no greater than the equivalent provided by about 14.9 volume percent methyl tertiary butyl ether;

(2) delivering said unleaded gasoline to a substantial number of gasoline service stations distributed within a geographical region with significant air pollution caused in substantial part by the emission of exhaust gases from the operation of automobiles within said region; and

(3) dispensing the unleaded gasoline from said gasoline service stations into a substantial number of automobiles for subsequent combustion therein, said automobiles having catalytic converters for treating exhaust emissions.

155. The method of claim 154 wherein the gasoline produced in step (1) is gasoline (a).

156. The method of claim 155 wherein the gasoline produced in step (1) comprises greater than 72 volume percent paraffins.

157. The method of claim 154 wherein the gasoline produced in step (1) is gasoline (b).

158. The method of claim 154 wherein the gasoline produced in step (1) is gasoline (c).

159. The method of claim 154 wherein the gasoline produced in step (1) is gasoline (d).

160. The method of claim 159 wherein the gasoline produced in step (1) has a 50% D-86 distillation point no greater than 210° F.

161. The method of claim 159 wherein the gasoline produced in step (1) has a paraffin content greater than 65 volume percent.

162. The method of claim 161 wherein said unleaded gasoline produced in step (1) contains less than 6 volume percent olefins.

163. The method of claim 162 wherein said unleaded gasoline produced in step (1) has a paraffin content greater than 72 volume percent.

164. The method of claim 117, 157, 158, 159, 161, or 163 wherein the 90% D-86 distillation point of said gasoline produced in step (1) is no greater than 315 °F.

165. The method of claim 164 wherein the 10% D-86 distillation point of said gasoline produced in step (1) is no greater than 140 °F.

166. The method of claim 165 wherein the Reid Vapor Pressure of said unleaded gasoline is no greater than 6.8 psi.

167. The method of claim 166 wherein the 50% D-86 distillation point of said gasoline produced in step (1) is less than 200 °F.

168. The method of claim 166 wherein the 10% D-86 distillation point of said gasoline produced in step (1) is no

greater than 135° F.

169. The method of claim 168 wherein the 50% D-86 distillation point of said gasoline produced in step (1) is less than 200 °F.

170. The method of claim 154, 159, 161 or 163 performed during a time period of one month wherein the amount of said unleaded gasoline dispensed in step (3) during said month is the equivalent of at least 100,000 gallons of gasoline per day.

171. The method of claim 170 wherein the 90% D-86 distillation point of said gasoline produced in step (1) is no greater than 315 °F.

172. The method of claim 154, 155, 157, 158, 159, 160, or 163 performed during a time period of one week wherein the amount of said unleaded gasoline dispensed in step (3) during said week is at least 10,000,000 gallons of gasoline.

173. The method of claim 172 wherein the 10% D-86 distillation point of said gasoline produced in step (1) is no greater than 140 °F. and the 90% D-86 distillation point of said gasoline produced in step (1) is no greater than 315 °F.

174. The method of claim 154 wherein the amount of said unleaded gasoline dispensed in step (3) over the course of one month is equivalent to at least 25% of the amount dispensed by all service stations in said region for said month.

175. The method of claim 117, 154, 155, 157, 158, 159, 160, 161, or 163 wherein, over a six month time period, the amount of said unleaded gasoline produced in step (1) is the

equivalent of at least 25% of the total of the refinery's daily gasoline production over said six month time period.

176. The method of claim 175 wherein the 90% D-86 distillation point of said gasoline produced in step (1) is no greater than 315 °F. and the 10% D-86 distillation point of said gasoline produced in step (1) is no greater than 140 °F.

177. The method of claim 176 wherein the 90% D-86 distillation point of said gasoline produced in step (1) is no greater than 300 °F.

178. The method of claim 142 wherein the gasoline introduced into said engine is unleaded, oxygenated gasoline (f).

179. The method of claim 142 wherein the gasoline introduced into said engine is unleaded, oxygenated gasoline (g).

180. The method of claim 142 wherein the gasoline introduced into said engine is unleaded, oxygenated gasoline (h).